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EXPEDITION OF THE CALIFORNIA ACADEMY OF SCIENCES TO THE GALAPAGOS ISLANDS, 1905-1906

VIII

THE BIRDS OF THE GALAPAGOS ISLANDS, WITH OBSERVATIONS ON THE BIRDS OF COCOS AND CLIPPERTON ISLANDS (COLUMBIFORMES TO PELECANIFORMES)

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The Expedition of the California Academy of Sciences to the Galapagos Islands was planned and organized through the untiring efforts of Mr. Leverett Mills Loomis, Director of the Museum of the Academy. Fortunately for the Academy, the Expedition was in the archipelago at the time of the San Francisco earthquake and fire of April, 1906. All of the collections of the Academy in San Francisco were destroyed in that catastrophe, so that the material gathered by the Galapagos Expedition formed the nucleus for the present extensive collections of the Academy, which have likewise been accumulated under the direction of Mr. Loomis. The collection of greatest bulk and importance brought back by the Expedition was, without doubt, the reptile collection, for which the Expedition was primarily organized. The bird collection was also

August 8, 1913

of large size, skins alone numbering 8,691. The unqualified success of the Expedition as a whole was unquestionably due to the ability and sagacity of its leader, Mr. R. H. Beck.

The personnel of the Expedition was as follows: R. H. Beck, chief; Alban Stewart, botanist; F. X. Williams, entomologist; W. H. Ochsner, geologist and conchologist; J. R. Slevin, herpetologist; J. S. Hunter and E. W. Gifford, ornithologists; E. S. King, assistant herpetologist; F. T. Nelson, mate; J. J. Parker, navigator; J. W. White, cook. The scientific members of the Expedition shipped in the capacity of seamen, so that in addition to collecting, the duties attending the working of the vessel likewise fell in a large measure to their lot.

The schooner "Academy," of eighty-seven tons burden, sailed with the Expedition from San Francisco on June 28, 1905, returning on November 29, 1906, after an absence of seventeen months and one day. During the southward voyage ten stops were made, while on the home voyage from Culpepper, Galapagos Islands, to San Francisco none were made. The home voyage was a slow one of sixty-five days. On the voyage south, short stops were made during the month of July, 1905: at Ensenada, San Martin Island, San Geronimo Island, San Benito Islands, Cerros Island, and Natividad Island, Baja California; and at San Benedicto and Socorro, Revilla Gigedo Islands. August 10 was spent on Clipperton Island, Mexico, which was reached only after many days of beating against contrary winds and currents. The early part of September, 1905, was spent at Cocos Island, Costa Rica. On September 13, the schooner set sail from Cocos with the Galapagos Islands as her destination. No intermediate stop was made; although two days were spent sailing down the coast of Ecuador from Perdenales in the Province of Esmeraldas, to Manta and Cape San Lorenzo. At Manta, on September 19, the schooner was put on the westward tack, and stood out along the north coast of the great headland. Hood Island, the southernmost of the Galapagos group, was reached at 9 A. M., September 24, after less than four days' voyage from Manta.

When calm weather afforded the opportunity, a great deal of collecting was done on the ocean, both on the outward voyage and on the homeward voyage, during our numerous jour-

neys from island to island, and also during two extended cruises to the southward of the Galapagos group. Only islands of the Galapagos group, however, are included in the enumeration at the head of the account of each species. In order to give a clear conception of the amount of time and the time of year spent on each island, the following table has been prepared:

DAYS SPENT ON THE VARIOUS ISLANDS OF THE GALAPAGOS GROUP

Island	Sept. 1905	Oct.	Nov.	Dec.	Jan. 1906	Feb.	Mar.	April	May	June	July	Aug.	Sept. 1906	Total
Abingdon	...	...	...	...	...	...	...	...	...	...	...	...	6	6
Albemarle	...	2	4	...	...	...	27	25	3	...	...	16	5	82
Barrington	...	5	...	...	...	...	...	...	...	...	3	...	...	8
Bindloe	...	...	...	...	...	...	...	...	...	...	...	...	3	3
Brattle	...	1	...	...	...	...	...	...	...	...	...	...	...	1
Champion	...	1	...	...	...	1	...	...	...	...	...	...	...	2
Charles	...	10	...	...	...	4	2	...	13	4	...	...	...	33
Chatham	...	5	...	...	7	11	...	...	...	...	6	...	4	33
Cowley	...	...	...	...	...	...	...	...	...	...	...	1	...	1
Culpepper	...	...	...	...	...	...	...	...	...	...	...	...	1	1
Daphne	...	...	2	...	...	...	...	...	...	...	1	...	...	3
Duncan	...	...	...	17	...	...	...	...	...	...	...	2	...	19
Enderby	...	...	...	...	...	...	...	...	1	...	...	...	...	1
Gardner-near-Charles	...	1	...	...	...	...	...	...	...	...	...	...	...	1
Hood & Gardner-near-Hood	7	2	...	...	1	6	...	...	...	8	3	...	...	27
Indefatigable	...	4	23	...	11	...	...	...	...	...	15	...	...	53
James	...	...	...	12	5	...	...	...	...	...	5	9	...	31
Jervis	...	...	...	4	...	...	...	...	...	...	...	...	...	4
Narborough	...	...	...	...	...	...	1	7	...	...	...	...	...	8
Onslow	...	...	...	...	...	1	...	...	...	...	...	...	...	1
Seymour	...	...	4	...	...	...	...	...	...	...	3	...	...	7
Tower	...	...	...	...	...	...	...	...	...	...	...	...	3	3
Wenman	...	...	...	...	...	...	...	...	...	...	...	...	1	1

In spite of the fact that more time was spent on Albemarle and Indefatigable islands than on any others, the most work remains to be done on those two islands. On Albemarle Island, Banks Bay Mountain, Cowley Mountain, and Iguana Cove Mountain yet remain to be climbed and explored—the last being the loftiest in the archipelago. The vast upland country of Indefatigable Island is in a similarly unexplored state. A third large island, Narborough, is practically untouched. All of the low country and the greater part of the mountain slopes of this island are lava wastes. High up on

the south side, however, there is considerable fertile green country. It was there that Mr. Beck found a very distinct new species of tortoise, *Testudo phantasticus*. As far as birds were concerned, not a single specimen was obtained there. The reasons for the failure of the Expedition properly to explore the mountains on Indefatigable, Albemarle, and Narborough islands, were primarily lack of pack animals, and secondarily lack of proper shelter from the drenching rains and fogs of the mountains. Nevertheless, the collections brought back are more extensive than any heretofore obtained. New territory was explored, and in some instances long journeys of three and four days' duration were made. For instance, on southeastern Albemarle the interior was penetrated for a distance of thirty miles.

The physical characteristics of the Galapagos Islands have been so well described by Messrs. Stewart and Williams in papers of this same series that the reader is referred to their remarks,[1] for the writer has nothing additional to offer. Mr. Stewart's classification of botanical regions has been followed in this paper. In the second part the matter of botanical regions in relation to the birds will be taken up.

Mr. Stewart likewise furnishes a good description of the physical characteristics of Cocos Island,[2] the bird-fauna of which is here treated along with that of the Galapagos Islands. The coral atoll of Clipperton has no land-birds, and hence but little interest attaches to it in connection with a study of the birds of Cocos and the Galapagos Islands. A description of Clipperton Island is omitted, although accounts of the birds are given along with those of Cocos Island and the Galapagos group. For an excellent description of Clipperton the reader is referred to Messrs. Snodgrass and Heller's paper on *The Birds of Clipperton and Cocos Islands*.[3]

For the sake of convenience, Dr. Sharpe's Hand-List of Birds has been followed in the matter of names and sequence of species throughout this paper. The seven species of petrels known to occur among the islands are to be treated by Mr. Loomis in a separate paper.

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[1]See Stewart, A Botanical Survey of the Galapagos Islands, Proc. Calif. Acad. Sci., 4th ser., v. 1, pp. 206-245; and Williams, The Butterflies and Hawk-Moths of the Galapagos Islands, Proc. Calif. Acad. Sci., 4th ser., v. 1, pp. 290-296.

[2]See Stewart, Notes on the Botany of Cocos Island, Proc. Calif. Acad. Sci., 4th ser., v. 1, pp. 375-383.

[3]Proc. Wash. Acad. Sci., v. 4, pp. 501-504.

In the few places where moults and plumages have been discussed, the plan followed is essentially Dr. Dwight's as set forth in various papers. A few changes in names of moults and plumages were necessitated by the fact that the Galapagos Islands are under the equator, and the word "winter" cannot be used to advantage. The appended list gives the order of plumages and moults. The unnumbered plumages and moults placed in square brackets are those peculiar to certain birds, such as some of the *Galliformes,* the *Procellariiformes,* the *Lariformes,* the *Phœnicopteriformes,* and the *Anseriformes.* Wherever the nomenclature differs from that of Dr. Dwight, his is placed in parentheses.

1. Natal Plumage.
2. Postnatal Moult.
   [Second Downy or Postnatal Plumage.]
   [Prejuvenal Moult.]
3. Juvenal Plumage.
4. Postjuvenal Moult.
   [Preliminary Postjuvenal Plumage (Dwight's First Winter Plumage—Preliminary).]
   [Supplementary Postjuvenal Moult.]
5. Postjuvenal Plumage (Dwight's First Winter Plumage; also his First Winter Plumage—Supplementary).
6. First Prenuptial Moult.
7. First Nuptial Plumage.
8. First Postnuptial Moult.
   [First Preliminary Postbreeding Plumage (Dwight's Second or Adult Winter Plumage—Preliminary; Eclipse Plumage).]
   [First Supplementary Postnuptial Moult.]
9. First Postbreeding Plumage (Dwight's Second Winter Plumage; also his Second or Adult Winter Plumage—Supplementary).
10. Second Prenuptial Moult.
11. Second Nuptial Plumage.
12. Second Postnuptial Moult.

The following remarks are necessary in regard to the measurements given. Lengths and extents were taken in the field from specimens before skinning. Wing-measurements are from the "bend" or carpal joint to the tip of the longest primary, the rule being laid along the outer or convex side, and the wing brought up close to it for its entire length. In four cases (*Nesopelia galapagoensis, Creciscus spilonotus, Gallinula galeata,* and *Spheniscus mendiculus*), however, the wing was measured with dividers, one point resting against the anterior side of the bend, the other touching the extremity of the longest primary.

Mr. Ridgway's *A Nomenclature of Colors* was used in determining colors.

In closing, I would say that since April 1, 1904, the day I first began the study of ornithology, there has always been at my hand a gentleman who has never withheld from me the fruit of his own labors. To Mr. Leverett Mills Loomis, as head of the Department and friend, I owe a deep debt of gratitude.

Nesopelia galapagoensis: Galapagos Dove

Abingdon, Albemarle, Barrington, Bindloe, Charles, Chatham, Culpepper, Daphne, Duncan, Gardner-near-Charles, Gardner-near-Hood, Hood, Indefatigable, James, Jervis, Narborough, Seymour, Tower, and Wenman islands.

The Galapagos Dove was common on Hood, Gardner-near-Hood, Duncan, James, and Abingdon islands. On Indefatigable Island it was abundant on the northwestern portion, and common on other parts. On Duncan Island it appeared to be restricted almost entirely to the floors of the two craters. On the remaining islands it was not common—particularly on Chatham, where it was decidedly rare.

The doves appeared to vary in abundance about the springs and water-holes at different times of the year, being more plentiful in the dry season than in the wet. During the latter season they are no doubt dispersed more widely over the country on account of the generally distributed water-supply.

Except on Charles Island, this dove appeared to occur almost entirely in the dry region of the islands. On that island, however, it was found, in all but one instance, about the springs in the rather humid interior. Its presence in the moist region of southern Indefatigable seemed to be governed by the weather; on warm, clear days it was met with, while on overcast, rainy days it was not seen.

Specimens taken on Hood Island, September 25, 1905, showed no particular enlargement of the reproductive organs. Nevertheless, the organs of birds taken on Wenman Island, September 24, 1906, were large, the breeding season for this species being later in the northern than in the central and southern islands—a point also noted in other species.

Except on Wenman Island, the nests of this dove were in small rocky cavities, usually in sloping ground. Eggs and nests were noted as follows:

On April 4, near the top of Narborough Island, at an altitude of about five thousand feet, Mr. Beck found a nest containing one fresh egg. The nest was in a slight hollow in the crevice of a cliff, and was lined with fern-stems and pieces of grass.

On Wenman Island on September 24, 1906, two nests with eggs were found—one with two fresh eggs, the other with two that were incubated. The nests were slight depressions in the ground, lined with grass and protected by the broad leaves of cactus (*Opuntia Helleri*), the plants growing very close to the ground. Mr. Hunter discovered a nest in a like position, and Mr. Beck found one lined with twigs and similarly sheltered on the edge of a sea-cliff. When flushed, the owners of the nests fluttered away as though wounded.

Messrs. Snodgrass and Heller found a nest with one fresh egg on James Island in April, and on Barrington Island they found the doves nesting during the latter part of May.[1] Messrs. Rothschild and Hartert make the following statement: "Mr. Beck writes: '*Nesopelia* was nesting on Bindloe in the last week of March, and several deserted eggs were found on Daphne.' "[2]

It appears that the breeding-season, taken as a whole throughout the archipelago, extends over seven months, from March to September inclusive.

On the rough lava of northeastern James Island, and on the steep tufaceous sides of the larger Daphne Island, a great many deserted nests, crudely lined with grass, were noted in little cavities in the rocks, usually sheltered from the weather by overhanging ledges or shelves.

Young of all ages were seen more or less commonly. On September 19, 1906, Mr. Beck found a partially naked young one, about a week and a half old, in a small cave on the south side of Abingdon Island; while a young bird, scarcely from the nest, was shot on Wenman Island on September 24, 1906. Mr. Beck found two nests with young on the latter island. One contained a naked nestling and an infertile egg, and the

[1] Proc. Wash. Acad. Sci., v. 5, p. 263.
[2] Nov. Zool., v. 9, p. 411.

other a pair of newly-hatched young. Several fully fledged young birds were seen on Hood Island on July 1, and two or three at Academy Bay on July 14. On northwestern Indefatigable, July 21, quite a number were noted among the hundreds of doves feeding about the grassy, tufaceous, coastal region. Two were seen on the south side of Abingdon Island, September 20 and 21, 1906.

The extreme lack of wariness of this species is undoubtedly the cause of its scarcity on Charles, Chatham, and Albemarle islands, where cats are common. On Chatham Island two doves were taken on July 7, while they were feeding in the wagon road. The next day the mutilated remains of one freshly killed were noted beside the road, and also a large black cat not far distant. Another specimen was taken on October 20. On Charles Island they were easy of approach, in spite of the fact that that island has been much frequented by man. From our experience, it would seem that this bird is rather slow in recognizing its enemies. In fact, they were so unsophisticated that we noosed many, and caught many in hand-nets. One day on Hood Island, Mr. King and I noosed twenty-one. The nooses were of thread, and were fastened to the ends of sticks six or eight feet long. The birds were followed about until an opportune moment arrived, when the noose was slipped over the head of one. We found we were more successful when barefoot than when wearing shoes, as the noise caused by the contact of shoes with rocks startled the birds. The males proved warier than their mates. On northwestern Indefatigable we killed a great many doves for food with sticks and stones.

They were frequently seen during the day, sitting in the trees and bushes and in the tree cactuses (*Opuntia*), and once or twice, during rains, taking shelter beneath overhanging rocks. During a brief interval of sunshine one day, on Gardner-near-Hood, I observed a flock of a dozen or more lying on their sides and stretching one wing up to sun themselves—a common habit among doves.

The daily flights of this bird seemed to take place chiefly in the mornings and evenings, and were evidently made to and from water and roosting-places. Single birds and straggling flocks were seen. Perhaps the largest flight was noted at James Bay, James Island, where, on the evenings of August 6

and 7, scores flew by towards the black lava south of the bay. They flew along the beach and over the water at an elevation of twenty or thirty feet, some much higher, coming from the direction of the lofty promontory at the north end of the bay. Occasionally doves were seen flying from Hood Island to the neighboring Gardner, and *vice versa;* and on July 25 two were encountered at sea flying from Daphne towards Indefatigable.

On the ground, the gait of the Galapagos Dove was similar to that of the Mourning Dove. Its flight, however, was neither as swift nor as graceful. In alighting, a whistling sound was often produced, apparently with the wings.

Their chief food was seeds and occasional pieces of green grass. Once some were seen eating cactus pulp from a fallen tree, and on another occasion several were seen feeding on the ocean-beach among the mangroves.

When killed, considerable water sometimes escaped from their mouths, as was also the case with Passerine Doves (*Chamæpelia passerina*) killed on Socorro, Revilla Gigedo Islands. Their drinking places were found to be rather varied. In some instances they were noted drinking from a tank epiphyte (*Tillandsia insularis*) which grew in the transition and forested moist regions, and which sometimes contained as much as a pint of water. On Bindloe Island they quenched their thirst with the water that condensed about the steam-holes in the craters. On other islands they resorted to springs, ponds, and water-holes, although some of the last at times contained rather salty water.

In passing from the plumage of the young bird, described by Mr. Ridgway,[1] into that of the adult, the first feathers of the adult plumage to appear are the vinaceous-chocolate feathers on the sides of the breast.

In nearly adult birds the last traces of immaturity are shown by a few wood-brown feathers in the breast, by the russet tips and edges of the alula, the primary coverts, and the small feathers along the edge of the wing near the carpo-metacarpal joint, and by the wood-brown edges of the secondaries and tertiaries. In this stage the inner primaries of the immature plumage are usually replaced by those of the adult plumage, while the light rusty margins of the remaining old primaries, characteristic of the young bird, are pretty well

[1]Proc. U. S. N. M., v. 19, p. 617.

worn off and faded. The primaries are therefore not renewed entirely until the adult plumage is practically assumed in all other particulars. Occasionally there are specimens in this stage with old, worn, faded feathers in the forehead. The Academy's series of immature birds contains specimens in all stages of moult.

The postnuptial renewal of the plumage is shown very well by a series of birds from Duncan Island taken in August. A similarly large series taken on that island in December is in rather worn plumage, including primaries. Evidently there is a partial prenuptial renewal of the plumage, for several of these specimens show a few new feathers appearing about the head, the neck, and the interscapular region. A few of the specimens taken on Hood Island in latter September and early October, 1905, give similar evidence. Several birds taken there in early February have well-worn rectrices and remiges, apparently evidencing that these feathers are moulted only annually. These specimens show pin-feathers in the head, breast, abdomen, and back. They are all females, no males being taken at that time.

In adults, as in immature birds, the last trace of moult is in the small coverts near the carpo-metacarpal joint. It is also evident that the young moult into the adult plumage, excepting primaries, at practically the same time (or perhaps a little later,) that the postnuptial moult takes place in the adults. The complete renewal of the primaries seems to be somewhat later, as shown by specimens of nearly adult birds taken on Duncan Island in December. In other words, birds in the postjuvenal plumage are practically indistinguishable from adults in postbreeding plumage.

A male, taken by Mr. Beck on Narborough Island on April 18, is evidently a breeding bird, and is in worn plumage without signs of moult. A female from Jervis Island, December 21, shows a large patch of pin-feathers on one side of the abdomen. This renewal was evidently caused by an accidental loss of feathers.

Birds showing albinistic tendencies were not uncommon, and were collected on Abingdon, Duncan, Gardner-near-Hood, and Hood islands.[1] In one of the most extreme cases in the series, a female (No. 252 C. A. S.), the black of the tertiaries,

[1]See also Bull. B. O. C., v. 10, p. 84.

scapulars, and wing-coverts has been largely replaced by very light gray, while the brown of those feathers is but very little lighter in color than normal. The four outermost primaries of each wing are worn, and are those of the normal immature plumage; while the remaining primaries are fresh feathers of a very pale gray color with darker tips. The tail and tail-coverts are also of an abnormal light gray, and there is a mottled appearance on the breast, due to the partial exposure of the pale bases of the feathers. The iridescent patches on the sides of the neck show feathers subterminally white. The head, however, is normal. Some albinistic specimens have all of the primaries pale gray with darker tips; others are variously, but less conspicuously, marked. The one showing the least abnormal coloration is a bird with several pure-white downy feathers in the abdominal region, completely hidden by the contour feathers. It is perhaps significant that all of the albinistic birds taken are adult, or are moulting into the adult plumage, the albinistic feathers being of that plumage. No albinistic young were found.

The Academy's series of skins of this species numbers 226, ninety-three of which are adult males, and eighty-one adult females. The extreme and average measurements of these in millimeters are as follows: Males—Wing 118–143 (132); tail 63–82 (73); culmen 16–19.5 (17.7); tarsus 22–27.3 (24.5); middle toe 20–25 (23.2). Females—Wing 114–131 (121); tail 55–73 (64); culmen 14.6–18.2 (16.3); tarsus 19.8–24.7 (22); middle toe 18.3–22 (20.5).

Table I, p. 111, shows the measurements of adults by islands. It will be noted that birds from Wenman and Culpepper islands are the largest, a fact noticeable in life. The males from Jervis Island are the longest-billed, and the females from Jervis are, in this regard, second only to females from Culpepper. The sexes are usually recognizable in life, males being decidedly the larger.

The four eggs of this dove possessed by the Academy are pure white in color and elliptical-oval in shape. The egg from Narborough Island measures in millimeters 26.4×20.4. The three from Wenman Island measure respectively 27×20.2, 26×19.7, and 26.3×19.6, the last two being from the same nest.

Creciscus spilonotus: Galapagos Rail

Porzana galapagoensis Sharpe, Cat. Birds Brit. Mus., xxiii, 1894, 113 (Galapagos Archipelago).
Creciscus sharpei Rothschild and Hartert, Nov. Zool., vi, 1899, 185 (Indefatigable Island).

Abingdon, Albemarle, Indefatigable, James, Narborough, and Seymour islands.

This rail is scarce on Abingdon, Albemarle, and Seymour islands; fairly common on James and Narborough, and very common on Indefatigable. Occurring both at sea level and at high altitudes, it is found under a variety of conditions, in the mangroves of the littoral region and in the dense and luxuriant vegetation of the moist region.

Two were shot by Mr. Beck on March 17, 1902, among thick ferns near fresh water in the vicinity of Villamil, Albemarle Island. One was taken in a mangrove swamp on the southern end of South Seymour in November, 1905. On Abingdon Island (altitude 1950 feet), it was found during September, 1906, just below the fern-belt which caps the highest portion of the island. In this situation it occurred among small plants about a foot in height, the spreading tops of which grew so close together as to obscure the ground. On Narborough Island, April 4 and 5, 1906, Mr. Beck heard it several times in the tall grass on the rim of the great crater at an elevation of between four and five thousand feet.

On Indefatigable Island, in November and January, this species was taken in the mangroves of the northern coast opposite Daphne, and in the mangroves at Academy Bay. In both places they were fairly easy to shoot, as the ground was not much hidden by the roots of the trees. On the south side of the island, from about 450 to 1100 feet—the highest altitude reached—they were common, and, because of the open spaces under the bushes and trees, quite easy to obtain. Below seven hundred feet they gradually diminished in numbers, owing to the increasing sparsity of the vegetation, and to its transition from humid to arid. In the forests these rails were far from wild, coming very close and peering with their little red eyes into the intruder's face. If a sudden movement or noise was made, they disappeared like a flash. Often many were heard, but few seen. On the first trip inland from Academy Bay, in November, 1905, only twelve were seen;

while on a trip in January, 1906, thirty were taken in one morning. When we traveled through the heavy undergrowth, their cackling calls were heard on all sides. To obtain specimens, it was usually necessary to stand quietly under a tree and clap the hands at intervals. The rails would cackle in response, and, as a rule, the collector would be rewarded by seeing one, or sometimes three or four, step stealthily into the open.

On James Island, in December, January, and August, they were found in the tall grass, which grew abundantly on the main peak (altitude 2,850 feet). It was a much more difficult matter to capture them than on Indefatigable Island, a long hunt often furnishing only one, or none at all. They traveled through little runways in the grass, and often, when seen, were too close to shoot. Their call notes were similar to those of the rails of Indefatigable Island, and they also responded to the clapping of hands.

The reproductive organs of specimens taken in November, 1905, on Indefatigable Island, and in early January, 1906, on James Island, were somewhat enlarged. A female taken by Mr. Hunter on Abingdon Island on September 21, 1906, contained a well-developed egg, and a male and a female taken by Mr. Beck had enlarged sexual organs.

There is great variation in the degree of white markings on the lower parts, and on the wing-coverts, back, rump, and upper tail-coverts. The three specimens from Abingdon Island are very sparsely spotted, while the specimen from South Seymour is pretty heavily marked. Birds from Indefatigable and James islands show about an equal range of variation—from specimens with practically no spots on the upper parts, to those that are heavily spotted. Both sexes vary equally in this regard.

The characters[1] given to distinguish *Creciscus sharpei* from *Creciscus spilonotus* break down in the Academy series. These characters are: a slight difference in the shade of brown of the back, with difference in size and in amount of white spotting. The James Island rails average slightly larger than those from Indefatigable Island, as is shown in Table II, p. 112.

The male from Abingdon Island measured in the flesh 157.8 mm. in length, and 241.3 in extent; while the only male from

[1]Nov. Zool., v. 6, p. 185.

Indefatigable Island so measured proved to be 145 mm. in length, and 228 in extent. Two males from James Island were 160 and 156 mm. in length, and 245 and 240 in extent. A female from Indefatigable Island was 138 in length, and 231 in extent; while a female from James Island was found to be somewhat larger, being 150 in length, and 240 in extent. No others were measured in the flesh.

The Academy's series of skins of this species numbers seventy-nine, thirty-nine of which are males, thirty-eight females, and two unsexed. Extreme and average measurements in millimeters are as follows: Males—Wing 61–72 (68.3); tail 20–26 (24.6); culmen 15–17.7 (16.13); tarsus 19.5–23.4 (21.53); middle toe 22–26 (24.2). Females—Wing 61–72 (66.6); tail 21–27 (23.6); culmen 14.7–16.6 (15.46); tarsus 19.7–22.6 (21.28); middle toe 21.8–25.4 (24).

Measurements in millimeters of a series of nine Black Rails (*Creciscus jamaicensis*), consisting of one male and eight females from about San Francisco Bay, California, are as follows: Male—Wing 66; tail 29; culmen 15.1; tarsus 19.5; middle toe 20.8. Females—Wing 65–68 (66.6); tail 29–34 (30.9); culmen 13–14.8 (14); tarsus 18.1–19.8 (19.04); middle toe 19.5–21 (20.46).

Comparing the average measurements of the Galapagos Rail with those of the Black Rail, it appears that the length of wing of the two species is practically the same, while in length of tail the Black Rail exceeds the Galapagos Rail by several millimeters, in spite of the fact that it is a smaller bird otherwise; viz., in length of culmen, length of tarsus, and length of middle toe. In other words, the bill and feet of the Galapagos Rail are larger in proportion to the other parts than are the corresponding members in the Black Rail. In the Black Rail, the development of wing and tail, as compared with that of the bill and feet, is much greater than in the Galapagos Rail.

The following remarks on the moults and plumages of the Galapagos Rail are made after a thorough study of the material in hand.

One male and two females from Abingdon Island show some wear, but no sign of moult. These specimens all had enlarged sexual organs, and were taken in September, which

is apparently the beginning of the breeding-season of this species there.

A male taken on Seymour Island, on November 22, shows wear, but the feathers of the breast seem to be fresh, and among them are a few just bursting from the sheath. A few pin-feathers are to be found among the scapulars.

All of the December and January specimens from James Island show a mixture of fresh and somewhat worn feathers in the body-plumage. In some specimens a few new brown feathers are just appearing from their sheaths in the anterior part of the brown mantle, and other new feathers are appearing in the sides of the breast. There is perhaps a prenuptial renewal of feathers in certain tracts, as apparently indicated by the above facts, for the specimens were obviously taken before the breeding-season; or else they indicate a somewhat belated postnuptial moult. Age may also be a factor. Three August specimens are very much worn.

The results of an examination of sixty-three specimens from Indefatigable Island, taken in November, 1905, and in January and July, 1906, may be summarized as follows:

November specimens, as a rule, show a mixture of fresh and somewhat worn feathers. Pin-feathers are appearing in the anterior part of the brown mantle in a few specimens. Some also show new feathers in the breast as well as in the back. An occasional specimen, such as No. 271, seems to be in entirely fresh plumage, including wing-coverts, which in practically all other specimens seem to show wear. Whether the new feathers, which are appearing in some, are the last of a postnuptial moult or the first of a prenuptial moult, is difficult to say. Again I am unable to tell what part age plays in the scheme of moults.

With one exception, twenty-seven specimens from Indefatigable Island, taken in January, exhibit no signs of moult; but all show wear in varying degree. These specimens are evidently in about the same category as the three specimens from Abingdon Island above mentioned. The one exception has pin-feathers in the back and in the sides of the breast.

Specimens from Indefatigable Island, taken in July, are assuming fresh plumage, and in most cases pin-feathers are still in evidence in the back and in the breast. In the majority of cases the new dress has been quite completely donned.

The examination of specimens for signs of moult brought to light five cases of feathers lacking pigment. In each bird so affected there was but one white feather; in four of the cases the feather was in some part of the neck, and in the fifth in the breast. Four of the specimens are from Indefatigable Island and one from James. The bird from James was taken in December, and the birds from Indefatigable, in November, January, and July.

Gallinula galeata: FLORIDA GALLINULE

Albemarle and Chatham islands.

Florida Gallinules proved to be tolerably common in the large salt-water lagoons fringed with mangroves, in the vicinity of Villamil, Albemarle Island, in November and August. They were wary and secretive. Usually they kept out of gunshot, and not more than two or three were seen at a time. An apparently immature male was shot by Mr. Hunter on a fresh-water pond at about one thousand feet elevation near Progreso, Chatham Island, on October 17.

In a high-plumaged male taken on southern Albemarle on March 6, the amount of white on the edge of the wing is extensive, but it is equaled in a specimen from Merced County, California. The tarsi of the Galapagos bird, however, have dried of a variegated orange-and-red color, while those of the California examples have dried chiefly of a dark olive-green.

The measurements in millimeters of the adult male from the Galapagos Islands are as follows: Wing 183; tail 73; culmen and frontal shield 47; greatest width of frontal shield 15.3; tarsus 53; middle toe 64.

The extreme and average measurements in millimeters of a series of seven adult males from Merced County, California, are as follows: Wing 175–190 (182); tail 70–74 (72); culmen and frontal shield 40–44.9 (42.4); greatest width of frontal shield 10.2–15 (13.1); tarsus 48–57 (53.1); middle toe 63–70.7 (65.8).

Spheniscus mendiculus: GALAPAGOS PENGUIN

Plate I, Fig. 1

Albemarle, Brattle, Charles, Duncan, James, Jervis, Narborough, Onslow, and Seymour islands.

The chief rendezvous of this penguin was Iguana Cove, Albemarle Island, where it was not unusual to see thirty or forty at a time. Several were seen at each of the following places, viz.: Cormorant Bay, Post Office Bay, and Black Beach Roads, Charles Island; northeastern Duncan; the west side of South Seymour; the east, north, and west sides of James Island; the east and north sides of Narborough; and at Banks Bay and Tagus Cove, Albemarle Island. One was seen on the northeastern side of Jervis, and another on Onslow. None were seen at Seymour in November, 1905, when the surf along the rocks was quite heavy; but in July, 1906, when the bay was tranquil, a few were noted. Careful search will probably show that this species occurs north of the equator, as it is not rare a few miles to the southward.

At Iguana Cove it was common to see eight or ten together on one rock, at other places never more than two or three. As a rule they could be approached closely. One was caught at Cormorant Bay on a flat rock several feet from the water. When seized, it turned on its captor with a snarl, and tried to bite. At Banks Bay a picture of three on a rock was taken at a distance of about ten feet. They evinced considerable curiosity, one swimming off a short distance and then returning to have another look.

In getting over the rough rocks the Galapagos Penguin uses both flippers and feet. The bird which was caught at Cormorant Bay and kept alive several days, sat upright most of the time. When moving about on deck, it progressed by small jumps, with its head and neck bent forward and downward, giving it a stooping appearance. In climbing a beam six inches high, it used its flippers as arms, placing them on top of the beam, and raising itself with the additional aid of its feet.

Small fish, up to four inches in length, constituted the food of this species so far as discovered. Often, when fishing, penguins would be followed closely by a small flock of Noddies, which would hover over them excitedly when a catch was made.

Nothing definite is known of the nidification of this species. A nest of sticks laid loosely together on the floor of a cave at Iguana Cove, was attributed to it. As additional evidence might be mentioned the fact that three birds were seen to enter

a small inaccessible cave, which had its opening at the water's edge. Two females taken at Iguana Cove on March 21, 1906, contained well-developed eggs.

Nearly all of the specimens taken were very fat, and occasionally a bird was taken in which the webs of the feet were slit. In an immature specimen (No. 342 C. A. S.) the anterior edge of each flipper shows a healed injury, which in the right flipper is a deep indentation. Each of these injuries appears to have been caused by a severe bite when the bird was small.

The description of the immature plumage by Messrs. Rothschild and Hartert[1] fits four of the Academy's specimens exactly. The measurements of the Academy's series of thirteen adults, however, do not confirm their statement that "The *female* differs from the *male* at a glance in being much smaller." A large male might be distinguished from a small female, but a medium-sized or small male could not be distinguished from a large or medium-sized female.

Every specimen in the Academy's series of seventeen exhibits anywhere from two to about thirty-three dusky feathers among the pure-white ones of the breast and abdomen. An apparently similar condition, attributed to melanism, is stated by Sir Walter Buller[2] to exist in certain specimens of the Yellow-crowned Penguin (*Megadyptes antipodum*).

None of the specimens in the Academy's series show moult in progress. When in worn feather, the dusky portions of the plumage assume a brownish cast, while in fresh plumage they are grayish. Table III, p. 112, gives the general condition of the plumage of each specimen, as well as the measurements of the specimen in millimeters.

In the flesh, No. 343 measured 480 mm. in length, and 375 in extent; while No. 354 measured 490 in length, and 394 in extent.

The extreme and average measurements in millimeters of the adult males and females follow: Males—Flipper 149–166 (156); tail 23–39 (27); culmen 57.4–61.1 (60.2); tarsus 26–31.6 (29); middle toe and claw 56.8–62.5 (60.2). Females—Flipper 140–155 (149); tail 19–30 (26); culmen 56–57.4

[1]Nov. Zool., v. 6, p. 199.
[2]Supplement Birds N. Z., v. 1, p. 94.

(56.7); tarsus 25.7–29 (27.2); middle toe and claw 56.3–60.7 (59.1).

The colors of the naked parts of the adults in life were as follows: Upper mandible mostly black; lower mandible blackish, becoming fleshy pink at base; iris claret-brown; feet black, usually mottled with grayish white.

Sterna fuliginosa: Sooty Tern

Crossman, Culpepper, and Wenman islands.

Although confined almost exclusively to Culpepper and Wenman islands and their vicinity, this tern was observed near the Crossman Islands on August 19, 1906. None were seen at Wenman on September 24, 1906, although they have been reported from that locality.[1] Several, however, were heard during the night between that island and Culpepper. On the north side of Culpepper on the following day, the air swarmed with these birds, most of them flying very high, and, judging by the incessant twittering sound which reached our ears, apparently all calling. This species nests on the top of Culpepper Island, which is inaccessible on account of the high cliffs on all sides.

During September, 1905, from latitude 3° 6′ North, longitude 84° 9′ West, southeast to Manta, Ecuador, and from there west to the Galapagos Islands, no Sooty Terns were seen. South of the Galapagos Islands during the months of May and June, 1906, they were met with three times:

May 8, latitude 2° 29′ South, longitude 90° 4′ West—one.
June 9, latitude 3° 39′ South, longitude 93° 1′ West—two.
June 13, latitude 3° 6′ South, longitude 91° 26′ West—one.

Inasmuch as we were cruising off and on south of the archipelago, for two months, we had ample opportunity for observation. The almost total absence of this species in this region and off the coast of Colombia and Ecuador as far south as Manta bears out Mr. Saunders' statement that it is "Almost unknown on the South American side of the Pacific."[2]

On the voyage from San Francisco to the Revilla Gigedo Islands, the Sooty Tern was met with on two occasions. On

[1] Nov. Zool., v. 6, p. 191.
[2] Cat. Birds Brit. Mus., v. 25, p. 110.

July 20, 1905, the first one was seen about noon, when in latitude 25° 56′ North, longitude 114° 11′ West. A young one was seen five days later, the schooner's position then being latitude 19° 37′ North, longitude 111° 11′ West.

The first breeding-place of this species visited was Oneal Rock, near Socorro, Revilla Gigedo Islands. There, on July 27, 1905, they and the Noddies were about equally abundant, thousands flying overhead as Mr. Beck and I landed on the rock. Whenever a shot was fired they arose in a cloud, and the calling was incessant. No fresh eggs of the Sooty Tern were discovered, but a number of well-feathered young were taken.

After leaving the Revilla Gigedo Islands, the species was not again encountered until in latitude 10° 43′ North, longitude 109° 10′ West, on August 3, 1905, when about a dozen were seen. This was in the vicinity of Clipperton Island, Mexico, where this tern breeds abundantly. They were seen quite commonly every day after that, while we were beating back and forth against contrary winds and currents in an attempt to reach the island, which we finally succeeded in doing on August 10. Very frequently the Sooty Terns were fishing in company with other birds such as Brewster's Boobies, Noddies, Clipperton Noddies, and Blue-faced Boobies, and often all were mixed indiscriminately in one large flock.

Messrs. Beck and Hunter reported Sooty Terns nesting by thousands on several low, flat islets in the brackish lagoon at Clipperton Island. On one islet, about eight hundred square feet in area and ten inches in elevation above the water of the lagoon, there were over a thousand eggs. They were laid on the bare coral with no semblance of a nest, and were so closely placed that it was necessary to step with extreme care to avoid crushing them. The owners were very fearless, and allowed themselves to be handled freely. They were also very noisy, and kept up a great din. On the 9th four hundred eggs were collected by the two residents of the island from a space twenty by twenty feet, and by 11 A. M. on the 10th over one hundred fresh ones had been laid in the same area.[1] The week before we arrived, a rise in the water of the lagoon had submerged some of the lower islets, ruining

[1]Cf. Hull, Birds of Lord Howe and Norfolk Islands, P. L. S. N. S. W., v. 34, p. 653.

hundreds of eggs. In addition to a large number used for food, we preserved 379, representing as many sets. A number of downy young of various ages were also taken.

After leaving Clipperton, Sooty Terns were not often observed, only six being seen on the voyage to the Galapagos Islands:

August 16, latitude 8° 1′ North, longitude 105° 22′ West—one.

August 19, latitude 7° 21′ North, longitude 103° 40′ West—one.

August 26, latitude 3° 41′ North, longitude 94° 16′ West—two.

September 2, forty miles south of Cocos Island, Costa Rica—an immature male taken.

September 16, latitude 3° 6′ North, longitude 84° 9′ West—an immature one.

On the homeward voyage Sooty Terns were observed twice. The first instance occurred on September 27, 1906, two days after leaving Culpepper, our position being latitude 5° 34′ North, longitude 95° 27′ West. About noon a flock of thirty or forty, with three or four Man-o'-war Birds following them, were seen working in a southeasterly direction. The second instance occurred on October 18, in latitude 16° 55′ North, longitude 112° 55′ West, when a single individual flew by the vessel.

Fifty-two skins of this species were brought back, twenty-seven of which are adult. Fourteen are downy young of various ages from Clipperton Island. The remaining eleven are immature birds. Of these, seven are in the dusky juvenal dress; with buff tips to the dorsal feathers posterior to the hind neck, and vinaceous-cinnamon tips to the under tail-coverts. They were taken from nests on Oneal Rock, and, although their wings were not full grown, they were probably able to fly. An immature male (No. 1351 C. A. S.) taken in latitude 19° 40′ North, longitude 112° West, on July 25, 1905, shows considerable dark coloration below and on the sides of the head, and is evidently going through the first prenuptial moult. The old dorsal feathers are so worn that it is impossible to distinguish any pale tips. At any rate the new scapu-

lars and interscapulars are dark gray with conspicuous white tips. New inner primaries, new upper wing-coverts, new tail-coverts, and new feathers on the under parts and about the head are also appearing. Some alternation is manifested in the replacement of the upper wing-coverts. An examination of the tail shows the two inner and the two outer rectrices to be new. The outer ones are not those of the full adult, but are dusky save for a terminal whitish spot on the outer web.

No. 1350 C. A. S., male, from forty miles south of Cocos Island, September 2, 1905, is very much like the bird just described, and has in addition some whitish streaking on the fore part of the crown. This specimen seems to exemplify more fully the plumage developed during the first prenuptial moult. The three outer primaries of one wing and the two outer of the other have not been replaced, nor have the two rectrices nearest to each of the outermost rectrices. Nos. 1348 and 1349, taken near Clipperton Island on August 5 and 8 respectively, are adult in every particular, save for a few dark feathers in the lower parts.

The fourteen downy nestlings collected on Clipperton Island on August 10, show some variation in age and size, which can perhaps be best indicated by the measurements of the culmen and tarsus of the largest and the smallest. Largest: Culmen 15.6 mm.; tarsus 17.1 mm. Smallest: Culmen 11.8 mm.; tarsus 13.9 mm. All exhibit the egg-tooth. Mr. Saunders' description of a chick[1] about three days old does not quite describe the conditions which exist in the Academy's series of chicks. The specimens are "streaked with grayish brown and dull white on the upper surface," but the white down is tipped with rufous. All the down of the upper surface appears as though the ends of the filaments of each tuft were twisted together, giving the surface a bristled appearance. There is more or less variation in the relative amounts of dark and light coloring, producing accordingly either a darker or a lighter dorsal aspect.

Two adults from the Revilla Gigedo Islands are in plumage quite worn, and show new feathers appearing in the back, among the upper wing-coverts, and in the breast. In one specimen the moult of the body-plumage is more advanced

[1]Cat. Birds Brit. Mus., v. 25, p. 109.

than in the other, although both were taken on July 27, 1905. New proximal primaries are appearing in both, and in one, new middle rectrices. In the other, the outer rectrices are appearing first. Undoubtedly this is the postnuptial moult, as proved by the presence of a few large-sized young on the nesting-site.

The Clipperton Island adults, taken during the first half of August, 1905, are all in somewhat fresher plumage; for the breeding-season was not over, as it was at Oneal Rock. With one exception, none show signs of feather-growth. In No. 1330 C. A. S., a few new interscapulars are appearing, their bases being still enveloped in the sheath.

Extreme and average measurements in millimeters are as follows: Fifteen adult males—Wing 275–295 (285); tail 142–194 (168); culmen 40–44.5 (42.4); tarsus 20.6–22.9 (21.9); middle toe 17.5–21.5 (20). Twelve adult females—Wing 278–300 (288); tail 170–216 (189); culmen 40–43 (41.2); tarsus 20.7–23 (21.6); middle toe 18.4–20.9 (19.6).

The following lengths and extents in millimeters were taken by Mr. Beck from birds in the flesh. The lengths of four males were 390, 450, 455, and 465; the extents were 838, 880, 882, and 899. A female measured 460 in length, and 870 in extent.

The following remarks are based entirely upon the series of fresh eggs collected on Clipperton Island, August 10, 1905.

They vary a great deal in shape, the majority being ovate, elliptical-ovate, and elongate-ovate. The rarer shapes are short-ovate, cylindrical-ovate, oval, elliptical-oval, and nearly ovate pyriform.

The ground color is likewise subject to great variation. The majority of the eggs vary in this regard from white to cream-color, cream-buff, and pinkish buff. In a number of cases the white ground color has a slight bluish cast. One abnormally-colored egg has a vinaceous-cinnamon ground with cinnamon-rufous spots and blotches, and suffused dull purplish blotches which appear to be beneath the surface. Another is vinaceous-buff, with bay spots of varying size and the usual faint suffused blotches. Still another is pale vinaceous-buff, almost immaculate save for several dark brown spots at the larger end, and a few pale suffusions. All of the eggs of the

series have these faint spots and blotches of dull purplish or brownish, which appear to be below the surface, just as though a coat of the ground color had been put over them.

The external spots and blotches vary greatly in size, number, and color. In size they range from minute dots to blotches the area of a dime. In number they vary greatly—some eggs being dotted over the entire surface, others being marked with both large and small spots, others with a few large spots and blotches, and in addition to these styles there is every conceivable sort of intermediate. However, no absolutely immaculate eggs occur in the series. As a rule, the markings are heaviest at the larger end of the egg, and very often the majority of the spots are at that end. In some specimens they are most numerous just below the larger end, forming sort of a wreath or zone.

The markings of a single egg may vary much or little in color. Usually there are several different shades of brown and reddish brown on a single specimen. In one case the markings range from cinnamon to seal-brown. In specimens with a white ground they partake more of brown than of red, while in specimens with a cream ground the reverse is true. On three or four specimens the reddish brown markings have a blurred aspect. Mr. A. F. Basset Hull, in his paper on *The Birds of Lord Howe and Norfolk Islands,* describes and figures similar variations.[1]

Three hundred and seventy-six eggs in the Academy's series yield the following extreme and average measurements: Length 44–59.2 mm. (50.6 mm.); breadth 33.2–38.5 mm. (35.9 mm.).

Anous stolidus: Noddy

Abingdon, Albemarle, Barrington, Bindloe, Brattle, Champion, Charles, Chatham, Culpepper, Dalrymple, Daphne, Duncan, Gardner-near-Charles, Gardner-near-Hood, Hood, Indefatigable, islet off northeast James, James, Jervis, Nameless, Narborough, Onslow, Seymour, Tower, and Wenman islands.

Noddies of the indigenous dusky variety were quite common throughout the archipelago, and were seen on the surrounding sea to a distance of about sixty-five miles.

[1] P. L. S. N. S. W., v. 34, p. 655, pl. 50.

They nested in crevices and holes, and on ledges of cliffs and caves, not more than thirty feet above the water. The single egg was usually placed in a slight depression, and surrounded by a few bones, seaweed, sticks, remains of crabs, and feathers, which composed the nest.

This species has been found breeding on Albemarle Island in February, March, and April; on Culpepper in July and September; on Hood in February; on Indefatigable in January; and on James in April—in all, during six months of the year. Eggs about to be laid were taken from birds captured at Academy Bay, Indefatigable Island, on January 22, and at Tagus Cove, Albemarle Island, on April 6 and 9.

Of four nests examined at Tagus Cove on March 24, one contained an egg in an advanced stage of incubation, another contained a lively chick two or three days from the shell, and the remaining two contained pretty well-developed young. The same day two young birds just able to fly were shot. A young one was taken from a nest on Culpepper Island on September 25, 1906.

It was not uncommon to see a Noddy sitting on the head of a Brown Pelican, while the latter was resting on the water swallowing fish. Once I saw two on a pelican's head at one time. Several often accompanied the young pelicans in their excursions along the coasts.

On the outward voyage from San Francisco in 1905, the first Noddies were met with on July 24 in latitude 19° 40′ North, longitude 112° West, several passing us that evening. A few were next seen along the coast of Socorro, Revilla Gigedo Islands, on July 27. That same day we visited Oneal Rock, which lies about a mile from Cape Henslow, Socorro. There Noddies and Sooty Terns were assembled in thousands. Only Noddies seemed to be nesting, and they were found all over the rock, each egg being deposited in a little depression. We caught many adults with our hands, while they were sitting on their nests, in addition to two well-feathered young.

After leaving the Revilla Gigedo Islands, Noddies were again seen on July 31 in latitude 13° 47′ North, longitude 109° 15′ West. In latitude 10° 43′ North, longitude 109° 10′ West, on August 3, one came aboard the vessel in the evening.

We landed on Clipperton Island, Mexico, on August 10. I worked about Clipperton Rock, where Noddies were nesting commonly, and were as unafraid as on Oneal Rock. Messrs. Beck and Hunter, who landed on some of the islets in the lagoon, stated that both this species and the Sooty Tern were nesting abundantly, and they obtained eggs and young of both.

Between Clipperton Island and Cocos Island, Costa Rica, the first certainly identified Noddies were seen on September 1, about thirty miles south of Cocos. An immature one was taken on the following day.

During our thirteen-day stay at Cocos Island, the Noddy was common along our route of travel by water between Chatham Bay and Wafer Bay. There was usually a good-sized flock on the point opposite Nuez Island, and also a colony on the small island between Nuez and Cascara islands. A small nesting colony was located on a rock near Conic Island. Their nests consisted of a few twigs, and were occupied by young birds which, with one exception, were nearly able to fly.

The Academy's series of skins of this species numbers 132. A downy young one from Clipperton Island is entirely white, save for a few black contour feathers appearing on the back, crown, and sides of the breast. The black feathers are tipped with white down. The only specimen in the down from the Galapagos Islands is of a brownish-gray color all over, shading into a paler gray on the abdomen, in contradistinction to the downy young one from Clipperton Island. This fact probably has no geographic significance, for young in both white and black natal down are found in the same colony.[1]

Two young from Oneal Rock are fairly well feathered except for the throats, which are covered with white downy teleoptiles. In one specimen the contour feathers appearing in the throat are tipped with grayish downy neossoptiles, and in the other with white. All of the young from Cocos Island are pretty well feathered, but show both white and gray down at the tips of the feathers, while the downy teleoptiles are pale gray in most cases.

Four specimens, Nos. 1439, 1473, 1475, and 1501, taken at Tagus Cove on April 5 and 7, were at that time going through

[1]Watson, Papers Tortugas Lab. Carnegie Inst. Wash., v. 2, p. 237, footnote, plate 4 (Watson).

what is probably the first prenuptial moult, involving the wings as well as the body. The newly-acquired feathers of the top of the head are darker than those of adults taken at the same time, and the ventral aspect of the body-plumage is browner.

Five adults from Oneal Rock, taken July 27, 1905, are in nuptial plumage somewhat abraded, and showing no indications of recent feather-growth, except in one case, where a pin-feather was found in the side of the neck.

Nine adults from Clipperton Island were taken on the breeding-ground, August 10, 1905. In No. 1416, male, the moult is in full progress. New primaries have replaced all but one of the old; new tail-feathers and new body-feathers are appearing. The white downy teleoptiles beneath the contour feathers are also being shed. Six other specimens show the moult under way; in the most it is just started, two or three pin-feathers usually appearing at the base of the hind neck. Two remaining specimens show no moult and are comparable to the specimens from Oneal Rock. Without a doubt, the moult which is beginning is the postnuptial. Two individuals taken at sea near Clipperton Island on August 8, are in the same stage as those from the island; one shows considerable new feather-growth, while the other exhibits but one pin-feather.

No. 1412, captured on August 3, ten miles north of Clipperton Island, has a great many remarkably abraded and faded feathers in the back, wings, and under parts. The new plumage is that of the adult, as shown by the feathers of the top of the head. The question is whether the worn feathers are of an immature or of an adult plumage, also whether the bird has not skipped a moult, or at most undergone only a partial moult. The extremely dilapidated condition of the old feathers would seem to indicate something of the sort. Furthermore I can find no feathers that may be attributed to a plumage appearing between the much worn one and the present new one.

In adults from Cocos Island taken during the first half of September, 1905, the postnuptial moult is in progress; primaries and rectrices are being renewed in some instances, as well as the body-plumage. In certain cases the moult is just starting.

The results of an examination of a series of adults from the Galapagos Islands may be summarized as follows:

A pair taken on Hood Island in latter September, 1905, seem to be just completing a moult which has involved the entire plumage. I cannot say whether it is prenuptial or postnuptial.

Eight specimens taken at Brattle Island on October 30, show, in the majority of cases, some feather-renewal about the head, back, and breast. The primaries and rectrices in all show varying degrees of wear. Apparently a moult is beginning, and it is likely that it is prenuptial, since the species has been found breeding on other southern and central islands in January and February. To six November specimens taken at Indefatigable and Daphne islands the same remarks are applicable. In one a new lateral rectrix is appearing.

A male from Duncan Island, December 6, shows no feather-growth and very little abrasion.

Fourteen January specimens, one from James Island and thirteen from Indefatigable, are evidently in nuptial plumage, and show no signs of feather-growth except in three specimens from Indefatigable. One is evidently a brooding male, and shows two new feathers appearing in the anterior part of the abdominal region; a second shows a new tail-feather and one or two new interscapulars; while in the third specimen the moult has gained considerable headway in the ventral tract.

A male from Hood Island, February 1, is evidently in nuptial dress.

On March 20 eleven adults were taken at Iguana Cove, Albemarle Island. All are in fairly fresh plumage, about half of them showing no pin-feathers. Of those with pin-feathers, two or three are getting new inner primaries.

A male from Tagus Cove, captured March 24, shows renewal of the primaries, rectrices, lesser wing-coverts, and body-plumage.

Nineteen examples from Tagus Cove, shot during the first half of April, show the postnuptial moult under way, and involving in most instances the wings as well as the body-plumage.

A female from south Albemarle, April 28, is undergoing a moult of the body-plumage, probably postnuptial. All but the two outer primaries of each wing have been renewed. A fe-

male, taken May 9 in latitude 2° 20′ South, longitude 90° West, is in a somewhat similar condition.

A male, captured on May 21 at sea south of Duncan Island, is in worn plumage, but with renewals taking place both in the body-plumage and in the flight-feathers. Two males from Indefatigable Island captured in July, are in a like state; but the replacement has progressed farther.

In all cases the pin-feathers appear black in contrast to the feathers of the disappearing plumage.

The Academy's series of adults, forty-six males and fifty-three females, gives the dimensions in millimeters of the species as follows: Males—Wing 250–291 (279); tail 136–173 (161); culmen 37.5–43.6 (40.8); tarsus 21.6–25.5 (24.2); middle toe 27.6–33 (31). Females—Wing 249–280 (272); tail 131–167 (155); culmen 35.5–42.8 (39.3); tarsus 21–25 (23.4); middle toe 27.3–31.7 (29.8).

Table IV, p. 113, shows the measurements of adults from the four localities visited. The Galapagos specimens average somewhat smaller in certain respects than their northern relatives.

Four males from the Galapagos Islands measured in millimeters in the flesh as follows: Lengths 396, 400, 401, 440; extents 824, 839, 845, 855. Six females from the same locality measured: Lengths 380, 380, 392, 396, 400, 400; extents of five 784, 809, 813, 813, 821.

The Academy's series of seventy-eight eggs exhibits no noteworthy variation in either coloration or form. It shows the variation in size to be: Length 47.4–56 mm. (51.1 mm.); breadth 32.2–38.5 mm. (35.5 mm.).

Micranous diamesus: Clipperton Noddy

This species was often seen in company with the Noddy, and in many cases, when the birds were seen at sea, it was impossible to distinguish the species with certainty.

On August 7, 1905, off Clipperton Island, Mexico, the first Clipperton Noddy was observed, and on the 9th the species was again certainly identified.

On August 10, Clipperton Island was visited, and this species was found nesting very commonly on Clipperton Rock. The nests, built of algæ from the lagoon, were placed on little

juttings of rock on the walls of the cliffs and of caves, and sometimes they were built on top of old nests. They were all damp, and about two-thirds of them contained eggs, some of which were incubated. Of eight eggs collected, two were fresh, while in the remaining six incubation had begun. With this species one egg constitutes a clutch. The owners were all lacking in timidity and several were caught by hand.

On September 1, 1905, the Clipperton Noddy was met with about thirty miles south of Cocos Island, Costa Rica, and the following day one was captured.

During our stay at Cocos Island in the first half of September, this species was found commonly along the shore line between Chatham and Wafer Bays. Three were seen flying up the fresh-water creek at Wafer Bay. They roosted in the trees as well as on the rocks along the shores. Individuals often circled about the small boat four or five times, keeping too close for shooting. Like the Noddy this species is quite readily decoyed to wounded birds. So far as noted neither species dives for its food. In two instances Man-o'-war Birds were seen in pursuit of Clipperton Noddies.

Messrs. Snodgrass and Heller[1] report this species as nesting in the tall trees near Chatham Bay in July. During our stay in September, young, a-wing, appeared to be more numerous than adults, evidencing that the breeding-season had passed. The two ornithologists referred to above report only immature birds at Clipperton in November.

The specimens in the Academy's series agree very well with the descriptions[2] of the adult and immature males given by Messrs. Snodgrass and Heller. There seem to be no characters, aside from length of culmen, which differentiate the males and females, either adult or immature. All of the young birds taken were able to fly, and all were captured at Cocos Island, with the exception of one secured on Clipperton, August 10.

Of a series of thirty specimens taken on Clipperton on August 10, one (No. 1593 C. A. S.) is completing the juvenal plumage, for the primaries and rectrices are yet in an immature state. Growing feathers are also to be seen in both the dorsal and ventral tracts. Two specimens, Nos. 1525 and 1548, are immature, and are going through a belated first

[1]Proc. Wash. Acad. Sci., v. 4, p. 510.
[2]*Ibid*, p. 509.

prenuptial moult, or else through the first postnuptial moult. The moult involves the entire plumage in both cases. It is to be noted that, in No. 1525, the two lateral and several of the median rectrices have been renewed, while in No. 1548, the renewal seems to be starting with the median rectrices. The remaining twenty-seven specimens are to all appearances adults in worn nuptial plumage. Nearly all are entering upon the postnuptial moult, as attested by pin-feathers in the back and breast and, in a few cases, by new inner primaries and new rectrices. No. 1523 exhibits a pure white feather at the base of the hind neck; aside from this, no trace of albinism was noted in the species.

Twenty-three Cocos Island adults are in a state somewhat similar to that of the Clipperton Island specimens, the breeding-season on the latter island evidently being later. In some cases the moult of the body-plumage, particularly anteriorly, seems to be farther advanced. Four immature specimens from Cocos Island, Nos. 1528, 1573, 1591, and 1592, seem to be comparable to Nos. 1525 and 1548 from Clipperton. It is presumed that the moult in this case is the first postnuptial. One specimen, No. 1528, seems to have recently acquired new primaries; in fact, the distal primary in each wing is just appearing from its sheath. Thirty-four Cocos specimens are in the juvenal plumage, and give no evidence of postjuvenal moult except an occasional pin-feather in the crown and back of several. September 13 is the latest date on which specimens were taken.

Certain adults show to some extent the character ascribed by Messrs. Snodgrass and Heller to *Micranous hawaiiensis* in the following sentence: "In *M. hawaiiensis* the pale slaty plumbeous color of the back of the head and neck reaches so far ventrally on the sides of the head and neck, and even on the upper part of the breast, that there is distinctly marked off on the chin and throat a median longitudinal area of dark plumbeous-brown well defined on each side against the paler lateral parts."[1]

The Academy's series of the Clipperton Noddy numbers ninety-three specimens, twenty-six of which are adult males, and thirty adult females. The adult males average in milli-

[1]Proc. Wash. Acad. Sci., v. 4, p. 510.

meters as follows: Wing 232; tail 124; culmen 44.7; depth of bill at base 9; tarsus 20.2; middle toe 27.8. The adult females average as follows: Wing 229; tail 121; culmen 42.2; depth of bill at base 8.4; tarsus 19.7; middle toe 27.5.

Four adult males and two adult females from Clipperton measured in millimeters in the flesh as follows: Males—Lengths 345, 355, 357, 370; extents 675, 677, 685, 700. Females—Lengths 353, 358; extents 672, 680.

Table V., p. 113, gives separately measurements of birds of both sexes from Cocos and Clipperton islands.

Seven eggs collected on Clipperton Island are elliptical-ovate and elongate-ovate in shape, and in color and style of markings resemble the eggs of the common Noddy. They measure in millimeters as follows: 44.8×31.5, 47.3×32.7, 43.7×32, 44.6×31.5, 46×30.8, 45.2×32.5, 45.6×30.8.

Gygis alba: WHITE TERN

Tower Island.

A White Tern passed close to the vessel on September 14, 1906, when off Tower Island. Another was captured by Mr. Beck on Oneal Rock, near Socorro, Revilla Gigedo Islands, on July 27, 1905. It was the only one observed among thousands of Sooty Terns and Noddies.

On August 9, 1905, the second specimen for the expedition was seen near Clipperton Island, Mexico. The following day, on that island, a dozen were found, in company with Brewster's Boobies, roosting on the crossbeams of a shed, one end of which had an opening, giving the birds access.

During the voyage from Clipperton Island to Cocos Island, Costa Rica, White Terns were noted as follows:

August 29, 1905, latitude 5° 22′ North, longitude 87° 5′ West—two.

August 31, 1905, latitude 4° 5′ North, longitude 88° 3′ West—a few.

September 2, 1905; forty miles south of Cocos Island—two or three.

At Cocos Island they were commonest in the forests, roosting in the trees both inland and along the coast. They were seen also among the trees on the small outlying Nuez Island.

The forests on Cocos Island are very luxuriant, and the island is well watered, streams flowing down on all sides. It is in this setting that the terns appear to greatest advantage. As a rule, the first intimation a person gets of their presence is a startling clucking over his head. Upon looking up he will find two or three of these beautiful inhabitants of the forest hovering within a yard of his head. After flying about him four or five times, they will dart away among the trees with a flight as sure as that of any woodland bird.

Over the water their flight was very swift and erratic, and usually at a considerable elevation. None were seen on the water. They paid but little attention to a boat, seldom approaching to examine it. At times they were seen in pursuit of each other, and then their evolutions were the swiftest. One day eight or ten were seen pursuing an Osprey.

Mr. A. F. Basset Hull, in *The Proceedings of the Linnean Society of New South Wales*,[1] takes exception to the remarks of Messrs. Snodgrass and Heller[2] on the method of nesting of this species at Cocos Island.

A young female (No. 1617 C. A. S.) in juvenal plumage, was obtained at Clipperton. The scapulars, interscapulars, and tertials are strongly washed with russet. The lesser coverts, some of the feathers of the crown and of the sides of the breast, and the two middle rectrices are edged with russet terminally. The forehead has a faint tinge of the same color. A few tufts of grayish down still adhere to some of the feathers of the top of the head. The shafts of the primaries are olive brown. Three outer rectrices on each side of the tail have pure white shafts, and the remaining rectrices have shafts that are white for the greater part of their length, being olive brown only subterminally. In length of wing and of tarsus this specimen exceeds the average of ten adult females given beyond. It measures in millimeters as follows: Wing 250; tail 115; culmen 33.5; tarsus 13; middle toe 21.

In the Academy's series of twenty adults, dark-shafted rectrices are a marked feature. With a few exceptions, the specimens are in somewhat abraded plumage. No. 1604, male, Oneal Rock, July 27, seems to be in fresh feather; occasional pin-feathers in the crown, back, and rump, are appar-

[1] V. 34. p. 662. footnote.
[2] Proc. Wash. Acad. Sci., v. 4. p. 511.

ently bringing the moult to a close. Nine Clipperton skins, August 10, are passing through what I take to be the post-nuptial moult. In some cases it seems to be almost completed, and, with the exception of No. 1619, it has reached the remiges in every case. Renewal of rectrices seems to proceed from the center laterally, renewal of primaries from the proximal to the distal, and renewal of secondaries apparently from the distal to the proximal. There are exceptions to these rules, certain feathers coming in out of turn. Ten Cocos specimens, taken during the first half of September, are in a similar state, but, if anything, are not quite so far advanced as the Clipperton specimens.

The bill of the adult bird in life is black at the tip, shading through purple to indigo blue at the base.

MEASUREMENTS (in millimeters)

No.	Sex.	Locality	Wing	Tail	Culmen	Tarsus	Middle Toe
1604	♂	Oneal Rock	240	115	37.4	12.9	20.4
1619	♂	Clipperton	223	110	38	12.1	21.3
1620	♂	Clipperton	252	122	38.6	12.7	21.8
1621	♂	Clipperton	234	120	41	12.7	22.5
1624	♂	Cocos	240	119	38.6	11.9	22
1623	♂	Cocos	251	118	43	12.5	21.2
1607	♂	Cocos	248	112	41.8	12.1	22
1606	♂	Cocos	239	120	41	13.2	22.1
1605	♂	Cocos	248	111	40.5	12.6	21.6
1608	♂	Cocos	260	119	42.2	12.4	22.2
1613	♀	Clipperton	241	122	41	12.8	22
1622	♀	Clipperton	231	129	39	12	22
1612	♀	Clipperton	236		37	11.6	21
1615	♀	Clipperton	235	107	36.7	12.5	21.2
1616	♀	Clipperton	240	118	40.8	12	22
1618	♀	Clipperton	237	111	38.3	12.2	21.4
1614	♀	Cocos	254	124	40	12.8	21.9
1611	♀	Cocos	237	116	39	11.7	21.2
1610	♀	Cocos	251	126	41.6	11.1	22
1609	♀	40 miles south of Cocos	245	122	38.9	12.1	22.4

The following is a summary of the above measurements: Males—Wing 223–260 (244); tail 110–122 (117); culmen 37.4–43 (40.2); tarsus 11.9–13.2 (12.5); middle toe 20.4–22.5 (21.7). Females—Wing 231–254 (241); tail 107–129 (119); culmen 36.7–41.6 (39.2); tarsus 11.1–12.8 (12); middle toe 21–22.4 (21.7).

Creagrus furcatus: Swallow-tailed Gull

Albemarle, Brattle, Champion, Charles, Chatham, Cowley, Crossman, Culpepper, Dalrymple, Daphne, Delano, Enderby, Gordon, Guy Fawkes, Hood, Indefatigable, islet off northeast James, James, Kicker, Narborough, Seymour, Tower, and Wenman islands.

This fine gull has been observed in the archipelago during every month of the year, and is found commonly about the small tufaceous islands and some of the high sea-cliffs of the large islands. None were observed about Elizabeth Bay, Tagus Cove, or Banks Bay, Albemarle Island, nor on east and north Narborough in March and April. It is a bird of powerful flight, often being seen many miles from land. The farthest south it was observed was about 160 miles southwest of Albemarle on June 9, 1906, and the farthest east was about 150 miles east of Chatham on September 22, 1905. No examples were met with north of the islands.

The single egg was usually laid in a slight depression lined with bits of stone. When disturbed the gulls generally flew off, leaving their eggs and young to the mercy of the intruder. In one case, however, a parent remained on the nest and allowed itself to be petted, not offering to bite. In many instances, when a bird was caught, its main effort was to escape rather than to defend itself. The young generally snapped their bills threateningly when molested.

The Swallow-tailed Gull is known to nest in the Galapagos Islands during eight months[1] of the year, as follows: On Brattle in October; on Culpepper in July;[2] on Hood in January, February, June, July, and October;[3] on Tower in September and December;[4] and on Wenman in July,[5] August,[6] and December.[7] The Academy's series of eggs was taken on Hood in February and June, and on Tower in September.

The eggs observed on Tower Island in the middle of September, 1906, were quite fresh, although a newly-hatched

[1]On page 190, volume 6, of Novitates Zoologicae, Messrs. Rothschild and Hartert state that this species was "found breeding * * * in October on Tower, and in December on Hood Island." This is undoubtedly a mistake, as the Webster-Harris Expedition visited Tower in December and Hood in October. See pp. 99, 103, 124, 135.

[2]Nov. Zool., v. 6, p. 190.

[3]*Ibid.*, pp. 99, 127.

[4]*Ibid.*, pp. 104, 135.

[5]*Ibid.*, v. 6, p. 190; v. 9, pp. 412, 413.

[6]*Ibid.*, v. 6, p. 90.

[7]Proc. Wash. Acad. Sci., v. 5, p. 238.

chick was also seen. A number of young birds in the down were encountered at Hood Island in February, all running about in a lively manner. Two or three young just able to fly were also noted walking about in hunched-up attitudes among the adults, and apparently begging for food.

As a rule these gulls could be approached fairly closely. After two visits to the islet off northeast James, however, the birds of that place became quite wary, often flying before the boat arrived within shot-gun range. As a rule this gull is not lured to a decoy; but exceptions were observed south of the archipelago, when two approached, one to examine a wounded Dark-rumped Petrel, the other a wounded Peruvian Booby.

Their enemies on land seemed to be the Galapagos Hawks. Two young birds on Hood Island, which were tied up and left for a short time, were killed and torn to pieces by one of these birds. The Man-o'-war Birds often pursued the adult gulls to make them disgorge, and the evolutions gone through by both species were very surprising, the victim dashing about in all directions. One poor gull was observed with two of its enemies in pursuit. It did not disgorge, and as a result one of the pirates seized its foot, injuring it so that it hung down, after which the tormentors desisted.

When flying, birds of this species seemed to have alternate upward and downward movements of the body with each stroke of the wings. Usually they flew singly or in flocks not exceeding half a dozen. On northeast Indefatigable some were seen circling high in the air without any discernible movement of the wings. They never circled about the vessel except at sea. Birds were seen resting on the water in only two instances, once at Daphne and once at sea. In the latter case a bird, which was flying close to the water, alighted. Three others very high in the air then came swooping down in long spirals, as Man-o'-war Birds do, and sat on the water with the first bird. Whether or not they were feeding, could not be ascertained.

I have never for a certainty observed them feeding, and rather suspect that as a rule they do so at night. Their diet seems to consist chiefly of squids, which both young and old often disgorge when being killed. At Daphne five or six

were seen hovering over a school of fish. Two birds taken in latitude 2° 29′ South, longitude 90° 4′ West, had each a specimen of water-strider of the family Hydrometridæ in its stomach; otherwise, save for wing-discs of pteropods, their stomachs were empty.

On the cliffs of northeastern Indefatigable Island in November, and on Daphne in November and July, only adult gulls were seen. The same remark applies to Tower Island in the middle of September, 1906, save for one very young chick.

In their descriptions of this species, both Mr. Ridgway[1] and Mr. Saunders[2] fail to mention a pinkish blush on the white of the under parts. This is quite marked in a number of fine fresh-plumaged Academy specimens of both sexes, taken about the first of August from the islet off northeast James. All the birds captured at that place at that time had enlarged reproductive organs, although some did not have the pinkish blush. It was not noted to any extent in specimens taken elsewhere.

This gull differs from *Xema sabinii* and other small hooded gulls in its moult. The dark hood is apparently kept the year around after the bird attains maturity. Nothing in the Academy's series would indicate the contrary, and the subjoined notes on this series seem to show that such is the case. The study of moults and plumages in this species is complicated by the fact that it has been found breeding on various islands during eight months of the year.

Two specimens taken on Hood Island in latter September, 1905, are in fresh plumage. Scattered pin-feathers are yet to be found in the white under parts and in the interscapular region. In one specimen the distal primary of each wing is still in the sheath basally. As this gull nests on Hood both in June and October, the question is whether this moult, which is just closing, is postnuptial or prenuptial. I am inclined to believe it is the latter.

Two specimens from Brattle Island, male and female, October 30, are in fairly fresh plumage. No feather-growth is indicated, however, and the feathers of the mantle show slight wear in places. At the time of our visit to Brattle

[1]Proc. U. S. N. M., v. 19, p. 638.
[2]Cat. Birds Brit. Mus., v. 25, p. 166.

Island, the birds were nesting, and an incubated egg was obtained. These specimens may be safely said to exemplify the breeding-plumage of the species.

The examination of twenty-one adults from Daphne Island and northern Indefatigable, latter November, proves that the birds are in fresh plumage. Feather-growth is attested in many by the presence of pin-feathers in the back and the breast, and by the sheaths at the base of the distal primaries. Evidently the rectrices in this species are entirely renewed before the distal primary is fully grown. The question of whether the moult just being completed is postnuptial or prenuptial again comes to the front. The only light on the nesting of this gull on Daphne is as follows: "Mr. Beck found it very common on Daphne Island, where it was preparing for nesting by the end of March."[1]

Twenty-two adults taken on Hood Island in early February, when nesting operations were at their height, for the most part show more or less wear. In a few cases pin-feathers are appearing in the interscapular region, but they are appearing more commonly in the white under parts. These pin-feathers evidently indicate the beginning of the postnuptial moult.

Of a pair of birds, taken at sea on April 24 off southwest Albemarle, the male is in worn adult plumage, and exhibits no new feathers. The female, No. 1675, is apparently an immature bird coming into its first adult plumage. Whether the moult is prenuptial or postnuptial is impossible to say. The feet are much paler than those of full adults. The tail is pure white and the outer rectrices quite worn. The primaries also show wear. Several white feathers in the sides of the head are hidden by the dark ones, while numerous dark feathers are appearing from their sheaths. This individual is evidently in a stage somewhat similar to that shown by No. 1721, mentioned below.

A female with small breeding-organs, taken at sea on May 8, is in rather worn plumage, and shows new dark feathers replacing the old ones of the crown.

Three adults with enlarged reproductive organs were taken at Hood Island about the first of July, the opening of a nest-

[1]Rothschild and Hartert, Nov. Zool., v. 9. p. 412.

ing season. One specimen was in slightly worn plumage dorsally, with pin-feathers still appearing in the breast; another was in fresh plumage, apparently with no growing feathers; the third, No. 1628, was in fresh plumage, with pin-feathers in the white lower parts and the remains of a sheath at the base of each distal primary. Now as these specimens are, in all likelihood, in nuptial plumage, the presence of a sheath at the base of a distal primary, in connection with the freshness of all the primaries, would seem to indicate a prenuptial moult of the flight-feathers as in the terns. Nothing in the entire series contradicts this assumption, but, nevertheless, I do not feel that I have enough light on the subject to assert positively that such is the case.

Thirty-three adults with enlarged sexual organs, from an islet off the northeast coast of James Island, were taken late in July and early in August. All are in fresh or slightly worn plumage (primaries included) and exhibit but little or no feather-growth. In these as well as in all other adults examined, some of the tertials and longer scapulars are worn, and not in harmony with the rest of the plumage. This is undoubtedly due to two causes; first, that some of the feathers are hold-overs, and second, that they are more subject to wear than other parts of the plumage.

Of three specimens from Cowley Island, August 13, two are quite fresh and show no pin-feathers. The third is somewhat worn, and has pin-feathers appearing in the back and in the white under parts.

A female from Culpepper Island, September 25, 1906, is in full fresh plumage, except for a much abraded long scapular and somewhat ragged outer rectrices. No pin-feathers or other indication of feather-growth are to be found. As this species breeds on Culpepper in July, this specimen is probably in postbreeding plumage.

A female (No. 1721 C. A. S.) taken at sea on May 8 is adult in every particular, save that the hood is mottled with pure white feathers, and the naked parts in life were paler than they are in the average adult. Numerous new dark feathers are appearing on the head to replace the worn white ones. A few pin-feathers are also to be found in the back and breast. The primaries and rectrices are slightly worn

and are not those of the juvenal plumage, but are similar to those of adults. The assertion might be ventured that this specimen is assuming the first nuptial plumage. A few worn feathers in the mantle, similar to those of adults, are of no significance, since a few such feathers are common in birds in juvenal plumage.

Quite a few white-headed young similar to the one described[1] by Mr. Saunders from Paracas Bay, Peru, were seen at sea in May and June, and at Hood Island in February, June, and September. Some have brownish tips to the crown-feathers, but these disappear as the birds grow older, the crown becoming pure white. The pale tips of the feathers of the back wear off to some extent with increasing age, giving the upper parts a much duskier appearance. There are gray feathers in the backs of young birds in juvenal plumage, foreshadowing the beautiful mantle of the adult stage. As remarked by Mr. Saunders[1] the primaries of the young are like those of the adult in markings, even in the very youngest in which they are developed enough for examination. They seem, however, to be more pointed and less rounded terminally than those of the adult. Five June specimens fom Hood Island are in juvenal plumage, more or less worn, but showing no evidences of moult. The same remarks apply to a male taken on Hood on September 28, 1905. Mr. Beck gives the following colors for the naked parts of a young female just fully fledged: Bill blackish; feet grayish white.

In a downy young one (No. 1658 C. A. S.) taken on Hood Island on February 6, the scapulars are just appearing, being fawn-color with dark brown bases. The down of the upper parts is brownish gray. Below it is chiefly white, shading to pale gray on the throat and chin. Much of the white down on the anterior part of the body has grayish hair-like tips. On the posterior portion of the body the down seems to be in two sections. The upper section in some cases is gray, and the lower white. The gray grows from the tip of the white, and at the junction of the two the filaments are gathered into a single, slender, compact stem.

An examination of young *Larus occidentalis* at approximately the same age as the downy *Creagrus furcatus* was

[1]Cat. Birds Brit. Mus., v. 25, p. 166.

fruitless as far as finding another case of double down was concerned; nor did the examination of the downy young of other Lariformes (*Hydrochelidon nigra, Sterna forsteri, Sterna antillarum, Sterna fuliginosa,* and *Anous stolidus*) develop another instance. Dr. Dwight makes no mention of such a condition in any of the Lariformes examined by him in the preparation of his paper on *The Sequence of Moults and Plumages of the Laridæ* (*Gulls and Terns*).[1]

In the following table are given measurements of eleven young gulls (in downy and juvenal plumages) taken from the colony on southeastern Hood during the first week of February, 1906.

MEASUREMENTS (in millimeters)

Number	1658	1640	1684	1652	1695	1642	1732	1726	1731	1729	1728
Sex	♀	♂	♂	♀	♀	♀	♂	♀	♀	♀	♂
Culmen	28	29.7	31.3	38.5	39.2	40.5	41.8	42.5	43.9	44	47.2
Tarsus	30.3	31.3	34.5	48.2	45.7	46.3	51.1	48	48	47.2	49.5
Middle Toe	32.4	34	36.1	44	44	45	46.7	43	45	46.9	47

The colors of the naked parts of the adults in life were as follows: Bill black, tip gray pea-green; rictus crimson; skin in interramal space salmon-colored; orbital ring crimson; iris dark brown; tarsus and toes peach-blossom pink; webs geranium pink shaded with black at edges.

Forty-three adult males measure in millimeters as follows: Wing 410–442 (424); tail 181–216 (196); culmen 50–55.5 (52.8); tarsus 45–56.5 (50.2); middle toe 44–51.3 (47.5).

Forty-seven adult females measure in millimeters as follows: Wing 406–432 (417); tail 181–210 (192); culmen 48.4–53.9 (51); tarsus 44.3–51.9 (48.1); middle toe 43–49.4 (45.8).

Five males in the flesh yielded the following measurements in millimeters: Lengths 571, 580, 590, 591, 606; extents 1362, 1375, 1382, 1390, 1392. Three females gave the following results: Lengths 550, 560, 573; extents 1241, 1318, 1330.

[1]Auk, v. 18, pp. 49-63.

The remarks[1] by Messrs. Rothschild and Hartert as to the markings and shape of the eggs of this species apply admirably to the Academy's series of thirty-six eggs. The extreme and average measurements of this series are summarized as follows: Length 62.1–72.5 mm. (66.3 mm.); breadth 44–47.6 mm. (45.9 mm.).

Larus franklini: Franklin's Gull

Albemarle, Chatham, and Narborough islands.

Three specimens of this gull have been taken in the islands; the first by Messrs. Snodgrass and Heller[2] at Mangrove Point, Narborough Island, in March; the second by Mr. Hunter at Sappho Cove, Chatham Island, on February 10, 1906; and the third by Mr. Hunter at Villamil, Albemarle Island, on March 6, 1906.

Both the Albemarle and the Chatham specimens were in worn plumage. The former was an immature male, infested with mallophaga, and the latter an immature female. Compared with the Sooty Gull, they were quite wild.

Larus fuliginosus: Sooty Gull

Abingdon, Albemarle, Barrington, Bindloe, Brattle, Champion, Charles, Chatham, Cowley, Crossman, Daphne, Duncan, Hood, Indefatigable, islet off northeast James, Jervis, Narborough, Seymour, and Tower islands.

Unlike the Swallow-tailed Gull, the Sooty Gull is not a bird of the sea-cliffs and ocean, but instead is found commonly about the shores and lagoons of many of the islands. Although taken at Hood Island by other expeditions, we did not meet with it there during any of our three visits. At Barrington, Brattle, Cowley, Crossman, Daphne, Duncan, and Jervis islands it was not common. Evidently birds fly from island to island, as their occurrence at places where they do not seem to be resident would show. On August 13, while we were en route from Cowley Island to Duncan, two or three were seen several miles from land.

More than once during the breeding season a pair of gulls would swoop several times at a human intruder in an evident

[1] Nov. Zool., v. 6, p. 190.
[2] Proc. Wash. Acad. Sci., v. 5, 237.

attempt to frighten him away from a nest near by, which, however, was never discovered. The only egg known was taken by the Webster-Harris Expedition on November 10, 1897,[1] from a bird shot on Albemarle Island.

Sexual organs of birds taken in October and November were large, while some adult birds taken off south Albemarle about the 1st of May were in fresh plumage and had large sexual organs. Mr. Beck wrote on the label of a male from Seymour, taken July 25, "testes large."

Wherever they were at all common, they came about the vessel, usually circling many times and often alighting on the water or on the booms, railings, etc., of the vessel, being fully as bold as the Glaucous-winged Gulls (*Larus glaucescens*) about San Francisco Bay, California.

The flight of this species is similar to that of other gulls of the same genus. They can walk and run quite swiftly, and, when rising from the ground, usually run three or four feet and rise against the wind. Like most other gulls they are readily attracted to wounded or dead birds.

The Sooty Gull is certainly a scavenger of the first order. Whenever tortoises or turtles were skinned on board the schooner, several gulls would loiter about picking up refuse. At Villamil, Albemarle Island, it was a common sight to see them feeding with the chickens about the village and under the houses, which in most cases were placed on timbers several feet above the ground. On the beach west of Villamil, forty or fifty gulls were one day observed feeding on the putrid remains of a turtle.

The following notes were made at Villamil on August 20: There were a dozen gulls feeding near a house where a bull had been slaughtered. Some were tugging away at bits of fat and flesh, often bracing themselves with their feet. Others were feeding on a fresh hide that had just been staked out to dry. Two or three adults were bullying the younger birds. Whenever an adult desired a piece of meat on which one of the younger ones was pulling, he would lower his head, arch his neck, and give a long cackling call, at the same time making a short rush at the enemy. The young birds always got out of the way when such tactics were pursued. There was one

[1] Nov. Zool., v. 6, p. 189; v. 9, p. 413.

immature bird imitating the calls of the adults, its voice, however, being harsher. Both young and adults had a wholesome respect for dogs and chickens. They would allow a man to approach within four or five feet of them before flying or running.

At Wreck Bay, Chatham Island, about three weeks later, I saw three adults chasing other adults about and making the same long cackling calls, always standing very erect for a moment before giving the call. In this case their actions may have been a form of courtship.

This species calls throughout the year, uttering a short squawk as well as the long cackling call, which latter can best be described as beginning with a chuckle and then breaking into a cackling laugh.

Not infrequently this species was seen in company with various other birds. Of such association the three following instances are good examples: 1. One day in early March there were a good many paddling about and calling in one of the lagoons near Villamil. Intermingled with them were Egrets, Galapagos Herons, Bahama Pintails, and Black-necked Stilts. 2. At southeast Narborough this species was noticed in company with Blue-footed Boobies, Flightless Cormorants, Brown Pelicans, and Galapagos Herons, on a small islet about ten by thirty feet in dimensions. 3. On a rocky point on the northeast side of James Island a gull was seen standing in the midst of a compact flock of Blue-footed Boobies.

Their competitors on the water seemed to be chiefly the Graceful Petrel and the Man-o'-war Bird. These two species were usually present whenever there was any refuse about. Other petrels of the Dusky Shearwater also entered in a lesser degree into the competition. About the settlements, chickens, dogs, cats, and pigs were their chief rivals.

The feet of individuals of this species seem to be subject to a good many accidents, for specimens with split webs were frequent and those with deformed toes occasional.

The plumages of this species have been so thoroughly described by previous writers that there is little to add, so far as the Academy's series is concerned. The white streak on each eyelid, which characterizes the adults, is represented in

the young birds by a faint gray streak, which gradually whitens with successive moults.

In the manner and extent of its moults and plumages this species seems to accord strictly with *Larus heermanni* and the other larger gulls treated of by Dr. Dwight in his paper on *The Sequence of Moults and Plumages of the Laridæ (Gulls and Terns)*.[1] The study of the moults and plumages is of course complicated by the lack of definite data concerning the breeding of the species. It is very evident from the Academy's series that there is great latitude in the time at which different individuals start on a stated moult. Birds taken on the same day and in the same locality sometimes differ widely in their state of plumage. Further indication of an extended breeding season is found in two birds in juvenal plumage, one taken on south Albemarle on November 1, the other taken on Chatham on July 7. A pair of adults taken on Charles Island, October 5, were evidently nesting, judging from the bare skin in two places beneath the feathers of the abdominal region. The absence of growing feathers shows that the postnuptial moult had not commenced. The adults of this species do not lose the dark hood at the postnuptial moult as do the smaller hooded gulls, but on the contrary replace it with another.

The following examples of albinism were noted in handling the Academy's series: No. 1759; nearly adult male; white feather in foreneck. No. 1735; adult male; conspicuous white streak in one web of scapular on right side. No. 1770; adult male; white feather in crown.

Colors of naked parts in life were noted as follows: 1. High-plumaged adult—Bill dark bay shading into black near tip; tip of maxilla burnt sienna; feet dark prune purple, with webs bay beneath and toes rufous beneath; orbital ring dark crimson. 2. Nearly adult female (No. 1793 C. A. S.) with some dark markings in the tail—Bill and feet black; tip of maxilla burnt sienna. 3. Immature—Bill, orbital ring, and feet black; under sides of webs gray.

The following condensed measurements in millimeters are taken from forty-nine males and fifty-five females. There seems to be no appreciable difference in the dimensions of

[1]Auk, v. 18, pp. 49-63.

adult and immature birds. Two females measured respectively in the flesh 445 and 450 millimeters in length, and 1075 and 1095 in extent.

Males—Wing 343–373 (357); tail 133–154 (145); culmen 40.5–47 (43.9); tarsus 47–54.8 (51.7); middle toe 38.5–45 (42). Females—Wing 330–358 (344); tail 130–147 (138); culmen 37.5–45 (41.4); tarsus 45.3–53.5 (49.9); middle toe 36.5–44.3 (40.3).

Stercorarius pomatorhinus: Pomarine Jaeger

Albemarle Island.

Mr. Beck shot a female Pomarine Jaeger off northern Albemarle Island[1] on December 15, 1897.

North of the Galapagos Islands this jaeger was occasionally met with, three being taken by Mr. Beck during the homeward voyage. Two females were captured on October 5 in latitude 14° 28′ North, longitude 107° West. A young male (No. 1849 C. A. S.), taken on November 14 in latitude 33° 7′ North, longitude 134° 6′ West, had the naked parts in life as follows: Iris dark brown; orbital ring black; nasal shield gray; bill broadly tipped with very dark brown; lower mandible lavender-gray, except distal portion; tarsi very pale blue; webs and toes almost entirely black, save at junction with tarsi.

Two Parasitic Jaegers (*Stercorarius crepidatus*) were taken at sea—one about thirty miles west of San Martin Island, Baja California, on July 10, 1905, and another in latitude 15° 36′ North, longitude 110° 12′ West, on October 13, 1906. On September 30, 1906, in latitude 10° North, longitude 100° 25′ West, one followed the schooner for several minutes.

Arenaria interpres: Turnstone

Abingdon, Albemarle, Barrington, Bindloe, Brattle, Charles, Chatham, Culpepper, Daphne, Gardner-near-Hood, Hood, Indefatigable, James, Jervis, Narborough, Seymour, Tower, and Wenman islands.

Although nowhere found breeding, this species was observed by us on all of the above islands and in every month of the year. It proved to be the commonest shore-bird of the

[1]Nov. Zool., v. 6, p. 192.

archipelago, and was found in the uplands as well as along the seashore. Between May 28 and June 23, however, but one individual was seen, and that was at Charles Island on June 1.

A few were seen at Wafer Bay, Cocos Island, Costa Rica, on September 4 and 13, 1905.

Of several individuals killed at Tagus Cove, March 29, some were in high plumage, while the majority were in transition. The sexual organs, however, showed only slight enlargement. A male, taken on southeastern Albemarle on May 1, was in high feather. Specimens captured on Hood Island, on June 23, had small reproductive organs, as did three or four obtained at Academy Bay, Indefatigable Island, on July 14.

Hæmatopus galapagensis: Frazar's Oyster-catcher

Hæmatopus frazari Brewster, Auk, v, 1888, 84 (Carmen Island, Gulf of California).

Albemarle, Barrington, Bindloe, Charles, Chatham, Gardner-near-Hood, Hood, Indefatigable, James, Narborough, Seymour, and Tower islands, Delano Rock, and islets east of Jervis Island.

As suggested[1] by Mr. Ridgway, *Hæmatopus galapagensis* and *Hæmatopus frazari* are undoubtedly one and the same species. Mr. Ridgway "reduces the alleged color differences between that bird [*Hæmatopus galapagensis*] and the Lower Californian form described as *H. frazari* by Mr. Brewster to two, namely, the smaller amount of dark color on the under surface of the wing and the partially spotted or barred under tail-coverts of the latter."[2]

A thorough examination of the Academy's material, twenty specimens from Baja California and forty-four from the Galapagos Islands, demonstrates that the "greater amount of white on the under primary coverts" of the so-called *Hæmatopus frazari* is an absolutely worthless character, as the series from both regions show an almost equal range of variation in respect to the coloration of these coverts. Twelve of the forty-four Galapagos specimens exhibit partial dark edgings on certain of the under tail-coverts; all, however, to a much

[1] Proc. U. S. N. M., v. 19, p. 623.
[2] *Ibid.*, p. 624.

less degree than shown by the average Baja California specimens. One female (No. 1941 C. A. S.) from the latter region, has no dark edgings on the under tail-coverts—a condition perhaps due to wear.

As shown by the measurements of Table VI, p. 114, there are but slight differences between average specimens from the two localities. The Galapagos birds average larger in length of culmen and length of middle toe, while the Baja California birds average larger in length of wing and length of tail. The measurements of the two series, however, overlap, and in the absence of constant color characters, it is impossible to find in the slight differences in the average measurements any basis for specific distinction.

Three young males from the Galapagos Islands (Nos. 1893, 1902, and 1930 C. A. S.) have down adhering to some of the juvenal feathers, considerable gray down on the throat, and primaries not full grown. Many of the scapulars, interscapulars, tertials, and wing-coverts are marked terminally with a narrow light-brown edge, and subterminally with a narrow dark-brown or black bar. The tarsi are very much swollen near the suffrago. This swelling, however, disappears as the birds grow older. In dried skins the young have the naked parts of a much darker color than the adults.

In two older specimens (Nos. 1891 and 1892) still showing traces of down on the rectrices, the brown edgings are yet present on the wings, but have disappeared from the back, having evidently been removed by wear. New feathers are appearing in the back, head, neck, and breast of these two specimens. The new feathers have no brown margins, but appear indistinguishable from those of adults. Inasmuch as the birds still show traces of neossoptiles, it is assumed that this moult is postjuvenal and not prenuptial.

The measurements of the five young birds are given below.

MEASUREMENTS OF YOUNG BIRDS (in millimeters)

Number	Sex	Island	Date	Culmen	Tarsus	Middle Toe
1930	♂	Hood	February 1	52	46.8	36
1902	♂	Hood	February 1	59.8	50.8	39.6
1893	♂	Narborough	March 22	63.1	50.7	36.5
1891	♀	Seymour	July 26	80	49	37.5
1892	♀	James	August 4	76	48.1	38.2

No. 1913, female, Hood Island, September 28, 1905, is evidently a young bird starting on its first prenuptial moult. The primaries are old and worn, and some feathers much bleached and worn remain among the lesser coverts. In addition to the dusky bill and feet, this bird has a sharp line of demarcation between the black and the white on the upper breast.

No. 1909, male, Indefatigable Island, July 16, is in fresh plumage. The distal primary in each wing, however, is not full grown, but is pulpy at the base. The feet are dusky compared with those of adults, and it is probable that the specimen is a young bird going through either its first prenuptial or first postnuptial moult. Again the line of demarcation of the black and white on the breast is sharp, while in adults such is not the rule.

No. 1888, male, Abingdon Island, September 18, 1906, is in about the same state as the specimen just discussed, or perhaps a little younger. The line of demarcation on the upper breast is sharp, and the naked parts are dusky. It is difficult to say whether this bird is completing its first prenuptial or its first postnuptial moult.

The following notes are on obvious adults: Five specimens taken on Hood Island and Gardner-near-Hood in latter September, 1905, are all in moult, and have primaries in some stage of growth. As the sexual organs of these birds showed signs of activity, and as we obtained young on the first of the following February, it seems as though the moult in progress is the prenuptial, and that this species moults its flight-feathers twice a year.

Four specimens from Indefatigable Island, secured during the second half of October, are moulting. One has worn primaries, another has new full-grown primaries, while the remaining two have the distal primaries still pulpy basally. Three November individuals, however, are in fresh plumage, the primaries just having attained full growth. In two cases traces of a sheath are discernible at the base of the distal primary.

The next specimen in order of capture is a male taken on James Island on December 26. Except for somewhat worn primaries, this bird is in fairly fresh plumage, and has a con-

siderable number of pin-feathers in the body plumage. It is perhaps completing its prenuptial moult, or possibly starting on its postnuptial.

Four January birds, three from Indefatigable Island and one from Hood, are in all likelihood beginning the postnuptial moult. All show pin-feathers and newly-expanded feathers in the body, and one shows new inner rectrices.

Two specimens from Hood Island and three from Chatham were taken during February. All show a moult in progress, and in one case the primaries have been renewed in part. Undoubtedly these birds were engaged in the postnuptial moult. The sexual organs of two of the specimens, obtained on February 14, were noted as small.

In addition to the young one shot on Narborough Island on March 22, a female (No. 1914) in worn plumage was secured. This bird showed the renewal of the body-plumage to be taking place. It was in practically the same state as the two adults taken on Hood Island on February 1, while the young one was of about the same age as the two young taken on Hood on February 1. This would seem to indicate a later breeding-season on Narborough than on Hood, or at least an extended breeding-season. No. 1925, Tagus Cove, Albemarle Island, March 29, is in the same stage as No. 1914.

A gap of nearly four months occurs in the dates of the series, the next specimens being five July adults from Indefatigable and Seymour islands. All show pin-feathers. Three are in fresh plumage: one with full-grown primaries, one with the distal primary growing, and one with it not yet renewed. A fourth specimen has worn feathers in the wings, tail, etc., and has only the two inner primaries new. The fifth bird has many worn feathers in the wings and interscapular region, and shows only the proximal primary and a central rectrix new.

A male and a female from James Island, taken on July 28 and August 3, respectively, are in the midst of a moult involving body, wings, and tail. Five individuals from Tower, Bindloe, and Abingdon islands, secured from the 15th to the 18th of September, 1906, are in the last stages of a moult involving the entire plumage. It is impossible to say whether

it is prenuptial or postnuptial, as I have no observations on the reproductive organs.

It not infrequently occurs that some of the middle wing-coverts, when fresh, have a narrow white margin. I do not know of what significance these are.

Specimens from Baja California obtained about the middle of July, 1905, are in worn plumage. All are beginning the postnuptial moult. In one case a bird is getting a new rectrix, but in all others nothing beyond the body-plumage has been affected.

Frazar's Oyster-catcher was found to be quite evenly distributed on all of the islands named above, but seldom more than three or four individuals were seen at one time. Singly or in pairs, we met with them along the rocky coasts, where they did most of their feeding. Occasionally they were seen on the sandy beaches, which are quite extensive on the larger islands. As a rule they were very fearless, and several were killed with stones.

In traveling over the smooth beaches this species either walks or runs, being able in the latter case to travel quite rapidly. One day on South Seymour two kept just ahead of us for about one hundred yards along a beach, running slowly all the time. When anchoring at James Bay, James Island, on August 6, three flew by the vessel, and later we met them on the beach. They alighted a hundred yards or so above us, and then started on the run in our direction. They acted as though they were racing, keeping abreast most of the time, and maintaining a steady pace. When among the rocks, these birds do considerable jumping from one rock to another, often using their wings to aid them.

Their flight is nothing like that of a snipe for swiftness and gracefulness, nor is it as erratic as the Hudsonian Curlew's. Usually, when over the water, the birds fly at a height of ten or twenty feet, while along the shores they keep lower down. Their wing-beats are more rapid than a gull's.

On two occasions this species was observed swimming, but not through choice. In one case a wounded one took to the water, and, upon being approached with the boat, dived three or four times. Another individual, wounded while flying

over the water at the San Benito Islands, Baja California, did the same thing and was captured only with great difficulty.

Aside from one instance, these oyster-catchers are always noted feeding on the rocks from which they pick their food. The food consists of small chitons, small crabs, sea-slugs, and key-hole limpets, which are chiefly obtainable at low tide. These creatures are all swallowed whole.

Many times the presence of this species is made known, not by the eye, but by the ear. As a rule they call when disturbed, and when flying from place to place. The call is loud and piercing, and consists of a series of piping notes given in quick succession, and slightly resembles the call of the Wandering Tattler. Single short staccato notes are also uttered when a bird is approached.

Three specimens, which showed signs of breeding, were taken on Gardner-near-Hood on September 28, 1905. Sexual organs of birds taken at Sappho Cove, Chatham, February 14, and at Academy Bay, Indefatigable Island, July 16, were small. A female with medium-sized ovaries was taken on Narborough on March 22.

On February 1, two young ones scarcely able to fly were taken on southeast Hood. They were feeding in company with two adult birds, presumably their parents. On March 22 a young one of about the same age was taken on Narborough. Another was taken on South Seymour on July 26, and still another on northeast James on August 4.

While I was approaching a wounded one on northwest Indefatigable, one of several Galapagos Hawks roosting in the vicinity made a sudden swoop at it. Uttering a shrill cry, the oyster-catcher sought safety by jumping into the water close beside a sheltering rock. It is doubtful whether the oyster-catchers are harassed by the hawks under normal conditions.

Like the Wandering Tattler, but not to such a great extent, this species has the habit of bobbing the posterior portion of the body up and down.

One bird taken had the outer covering of the upper mandible loose and apparently ready to shed, for it was very easily detached, leaving a new, hard, and darker-colored bill beneath. Another specimen was minus the greater part of its tongue, having only about one quarter of an inch of it left.

In Baja California the species was first met with on San Martin Island, July 11, 1905, where one was seen in company with seven Black Oyster-catchers (*Hæmatopus niger*) on the shores of the lagoon. At the next stop, San Geronimo Island, July 13, eight of the first species and twelve of the second were observed, all on the rocks along the beaches. They proved fairly easy of approach, and when flying kept up a continual calling. At the San Benito Islands, July 14 and 15, Frazar's Oyster-catcher was in the ascendency, ten or a dozen being seen each day to only one of the Black, while at South Bay, Cerros Island, July 18, it was fairly common, and only two or three Black Oyster-catchers were encountered.

Squatarola helvetica: Black-bellied Plover

Albemarle, Charles, Chatham, Hood, Indefatigable, and James islands.

The Black-bellied Plover was not common, but was observed a dozen or more times on the above islands, where it was very wild. There was an interval of three months during which the species was not seen—April 25 to July 28.

Mr. Beck reports[1] having seen two Black-bellied Plovers on Clipperton Island on November 19, 1901.

Two Wilson's Plovers (*Ochthodromus wilsoni*) were taken on Cocos Island, Costa Rica; a male on September 4 and a female on September 11, 1905.

Ægialeus semipalmatus: Semipalmated Plover

Abingdon, Albemarle, Bindloe, Charles, Chatham, Indefatigable, James, Jervis, and Narborough islands.

Quite a number of this species were observed about the islands from July to April. The earliest bird was noted on July 17 and the latest on April 25. Like the Turnstone, they were found in the grassy uplands as well as on the coast.

On September 4, 6, and 11, 1905, a few were seen on the beach at Wafer Bay, Cocos Island, Costa Rica, where three males were secured.

[1]Condor, v. 9, p. 109.

Himantopus mexicanus: BLACK-NECKED STILT

Plate I, Fig. 2

Albemarle, Charles, Chatham, Hood, Indefatigable, James, and Seymour islands.

This noisy bird we found to be rather common on the above-mentioned islands with the exception of Hood and Seymour.

On February 25 a nest containing four eggs incubated about seven days, was found on a small flat lava-islet in the large lagoon at Cormorant Bay, Charles Island. The islet projected less than five inches above the surface of the lagoon. The nest was composed of twigs, small pieces of moss taken from the lagoon, and bits of lava placed in a slight depression in the rock. Close by were seven Flamingo nests in use. The eggs measure in millimeters, respectively: 41×29.5, 42.4×29.5, 41.9×29.8, 41.6×29.9. The Academy has of this species twenty clutches of four eggs each, from Merced County, California. All were taken by Mr. Beck in May and June, 1908, showing that, so far as known, the breeding-season in the Galapagos is much earlier than in California.

Numenius hudsonicus: HUDSONIAN CURLEW

Albemarle, Charles, Chatham, Hood, Indefatigable, James, and Narborough islands.

This species was observed quite commonly about Albemarle, Charles, Indefatigable, and James islands, proving to be a bird of the interior as well as of the shore. On Charles Island it was found in considerable numbers in the open stretches among the low trees and bushes at an altitude of a thousand feet on the west side of the island, as well as in the pasture lands of the interior. At Villamil, Albemarle Island, it was not infrequently seen perching in the tall, bare, dead trees close to the village and about the large lagoon.

From the time we arrived at the islands up to the latter part of April, curlews were fairly common. One or two individuals were noticed at Villamil as late as May 2. One was shot on Hood Island on June 25. From July 14 on, they were seen frequently.

Only one was encountered at Cocos Island, Costa Rica—a female in worn plumage, shot on the beach at Wafer Bay on

September 12, 1905. Mr. Beck reports[1] having seen one on Clipperton Island on November 19, 1901.

Symphemia semipalmata: Willet

Abingdon and Albemarle islands.

On November 1, 1905, a Willet was seen on the ocean beach near Villamil, Albemarle Island. Another was observed in the same locality with a small flock of Hudsonian Curlews on September 3 of the following year.

A male (No. 1980 C. A. S.) was captured on a beach on the south side of Abingdon Island, September 21, 1906.

Helodromas solitarius: Solitary Sandpiper

Chatham Island.

Two specimens are reported from Chatham Island, October 12, 1897, by Messrs. Rothschild and Hartert in the *Novitates Zoologicae*[2] for the year 1899. I know of no other record of this species from the Galapagos Islands.

Heteractitis incanus: Wandering Tattler

Abingdon, Albemarle, Barrington, Bindloe, Brattle, Champion, Charles, Chatham, Culpepper, Duncan, Gardner-near-Hood, Hood, Indefatigable, James, Jervis, Narborough, Seymour, Tower, and Wenman islands.

The shrill, piping call of the Wandering Tattler was a very characteristic sound of the Galapagos coasts. As a rule lone birds were seen, but on February 1, 1906, a flock of nine was noted on Hood Island, while a flock of a dozen was seen on Clipperton Island, Mexico, on August 10, 1905. In the Galapagos Islands the species proved to be a common one, and was observed throughout the year except from April 11 to June 25. At Cocos Island, Costa Rica, during the first half of September, 1905, a few were seen along the rocky shores.

On two occasions Wandering Tattlers were seen in unusual situations. On Indefatigable Island several were seen feeding in the salt lagoons, while on south Albemarle I saw one

[1] Condor, v. 9, p. 109.
[2] V. 6, p. 188.

alight in a bare dead tree on the shore of a lagoon at least a quarter of a mile inland.

Tringoides macularius: Spotted Sandpiper

Abingdon and Albemarle islands.

A male (No. 1990 C. A. S.) shot at Villamil, Albemarle island, on May 2, 1906, was in fairly high plumage. A second individual was seen on the south shore of Abingdon Island on September 22, 1906.

In 1905, two females, Nos. 1991 and 1992, were taken on Cocos Island, Costa Rica, on September 4 and 7 respectively. Several examples were observed daily on September 4, 5, 6, 7, 8, and 11, at both Chatham and Wafer Bays.

On September 13 a female Semipalmated Sandpiper (*Ereunetes pusillus*), No. 1993 C. A. S., was taken on the beach at Wafer Bay.

Calidris arenaria: Sanderling

Abingdon, Albemarle, Bindloe, Charles, Chatham, Hood, James, Jervis, and Seymour islands.

The Sanderling was seen only two or three times in the saline coastal lagoons, but was fairly common on certain occasions on the ocean beaches. It was observed in July, August, October, November, February, and March. Like the Black-bellied Plover, it was very shy and difficult of approach.

Limonites minutilla: Least Sandpiper

Abingdon, Albemarle, Barrington, Charles, Indefatigable, and James islands.

The Least Sandpiper was not infrequent, being noted on all of the above-mentioned islands during the months of July, August, September, October, November, and February. On July 28 several were observed in a large lagoon on northeastern James; with them were a number of Hudsonian Curlews, Black-bellied Plovers, and Semipalmated Plovers. They haunted the ocean beaches as well as the lagoons.

A few were seen at Wafer Bay, Cocos Island, Costa Rica, on September 4 and 11, 1905, specimens being secured.

Heteropygia bairdi: Baird's Sandpiper

Barrington Island.

The Webster-Harris Expedition captured a male on Barrington[1] on October 6, 1897.

A male (No. 2004 C. A. S.) was taken at Wafer Bay, Cocos Island, Costa Rica, on September 4, 1905.

Phalaropus hyperboreus: Northern Phalarope

Albemarle, Indefatigable, James, and Narborough islands.

No specimens of the Northern Phalarope were taken, but we saw the species at times about the archipelago. Two or three bands of about twenty each were seen on the water on a very foggy morning, April 10, in Banks Bay, Albemarle Island.

On August 13, while sailing from Cowley Island to south James, hundreds of phalaropes, apparently of this species, were seen near the latter island. They were flying south close to the water, while a few were seen on the water. It was a cool day with a brisk southeast wind.

In the early afternoon of September 12, when about ten miles southwest of Indefatigable Island, we came upon thousands of phalaropes in large compact flocks, mostly on the water. The flocks were close together, and as far as one could see, looking from the deck towards Indefatigable, the water was dotted with them. The sky was overcast, the temperature moderate, and the usual southeast trade wind was blowing.

On August 18, 1905, in latitude 7° 24′ North, longitude 103° 52′ West, three Red Phalaropes (*Crymophilus fulicarius*) were seen, two of them being taken.

Steganopus tricolor: Wilson's Phalarope

Albemarle Island.

On November 3, 1905, two males and one female were shot on a small saline lagoon about half a mile inland from the village of Villamil, Albemarle Island. They were very tame and unsuspicious.

[1]Nov. Zool., v. 6, p. 188.

The specimens are in process of moult from the juvenal plumage to the postjuvenal plumage, being in about the same stage as a young female (No. 13475 C. A. S.) taken in Merced County, California, on September 3, 1908. The upper parts, particularly the wing-coverts, still contain a good many of the feathers edged with light sandy-buff that characterize the young.

Ardea herodias: Great Blue Heron

Albemarle, Charles, Chatham, Duncan, Hood, Indefatigable, James, Narborough, and Seymour islands.

Although usually solitary, Great Blue Herons are not uncommon on the central and southern islands. They seemed to be confined to the vicinity of tide-water, and did not frequent the salt lagoons, which were the haunts of the Flamingoes and Egrets.

They lacked the wariness of northern birds, and at times would allow approach to within a few yards. On one occasion an individual followed me about on wing in a mangrove swamp, apparently from curiosity. Each time I moved away a short distance, it would leave the tree on which it had settled, and fly to another near by, and crane its neck and peer down at me. At another time one was attracted to a dead bird of the same species, although a party from the schooner was standing in plain view within twenty-five yards.

A bird with enlarged sexual organs was shot on the northwestern part of Indefatigable Island on July 23. Three months later Mr. Hunter obtained on southeastern Indefatigable a nearly naked young one, with pin-feathers just appearing, while Messrs. Rothschild and Hartert report a clutch of three fresh eggs on that island on September 2.[1] Messrs. Snodgrass and Heller found a set of three eggs on Narborough Island in January.[2] As with the Frazar's Oystercatcher, the breeding-season appears to be quite extended, or else it is later on Narborough than on the islands to the eastward of Albemarle.

There seem to be no color characters distinguishing Galapagos specimens of the Great Blue Heron from middle-Cali-

[1]Nov. Zool., v. 6, pp. 93, 115, 180.
[2]Proc. Wash. Acad. Sci., v. 5, p. 254.

fornia specimens, except that the colors of the latter average a trifle darker. A comparison of the measurements of adults from the two localities (Table VII, p. 114) show that the Galapagos specimens average smaller in length of wing, tail, and tarsus, and larger in length of culmen.[1]

Herodias egretta: Egret

Albemarle and Indefatigable islands.

Unlike the Great Blue Heron, this species was wary and very difficult to obtain, perhaps on account of the fact that the natives hunted it somewhat for its plumage. It could be approached only under cover. A few individuals were often seen about Villamil, Albemarle Island, perching in some high tree in the midst of an impenetrable mangrove swamp, or else standing in some inaccessible part of a lagoon.

Unlike the Great Blue Heron, the Egret frequented the saline coastal lagoons, which are unaffected by tides. At Villamil, one day in March, I saw fifteen of them in the large lagoon. On November 29 one was taken in a lagoon on northern Indefatigable Island, opposite Daphne.

The measurements of Table VIII, p. 115, show that the Californian specimens average slightly larger than those from the Galapagos Islands; the series of the latter, however, is very small.

Nyctanassa violacea: Yellow-crowned Night Heron

Plate II, Fig. 1

Abingdon, Albemarle, Bindloe, Brattle, Champion, Charles, Chatham, Duncan, Gardner-near-Hood, Hood, Indefatigable, James, Jervis, Narborough, Seymour, and Tower islands.

The Yellow-crowned Night Heron was fairly common in the archipelago, being found along the shores of the above-mentioned islands, while on Albemarle and Tower it was seen in the interior as well. Like the Galapagos Heron, it frequented rocky and cliff-bound coasts, as well as those fringed with mangroves. At Villamil, Albemarle Island, it was observed about the large saline lagoons. On Tower Island, September 14 and 15, 1906, two or three were noted a quarter of a

[1] Cf. Bangs, Proc. New England Zool. Club, v. 3, pp. 99, 100; Oberholser, Proc. U. S. N. M., v. 43, pp. 549, 550, 559.

mile inland among the rocks and bushes. On the east side of Cowley Mountain, Albemarle Island, on August 10 and 11, the tracks of these birds were noted in the dust of the donkey trails at an altitude of about twenty-four hundred feet, and an immature bird was seen. On August 30, at the village of Santo Tomas, Albemarle Island, at an altitude of about twelve hundred feet, a peon brought in an immature one which he had caught early that morning. On other islands they were often found in the brush a short distance from the beach, but never up in the mountains, as on Albemarle. Like the Galapagos Heron, this species proved a very easy one to approach.

A male, taken on Duncan Island on December 2, and showing traces of immaturity, had enlarged testes. Four adults taken on June 25 on Hood Island had small sexual organs, as had an adult male taken at Academy Bay, Indefatigable Island, on July 16. The same remarks also apply to a specimen taken in a cavern on Abingdon Island on September 22, 1906.

A nest of this species was found on March 10, on a point thickly clothed with mangroves, which jutted into the large lagoon beside the road leading inland from Villamil. The nest was a bulky affair placed in a low flat bush about two and a half feet above the ground. It was built of twigs and lined with grass, and contained four pale greenish-blue eggs, nearly ready to hatch. On March 15 another nest was found a short distance from the beach about two miles west of Cape Rose, Albemarle Island, and it contained two very small young.

On July 28, 1905, three Yellow-crowned Night Herons were seen in the brush near Braithwaite Bay, Socorro, Revilla Gigedo Islands, and one was secured. On Cocos Island, Costa Rica, during the first half of September of the same year, they were not infrequent, being seen in the trees and along the fresh-water streams.

The material from Socorro and Cocos in the Academy's collection is very inadequate. An adult male from Socorro and one from Cocos are both slightly paler than adults from the Galapagos Islands. The measurements given in Table IX, p. 115, are all from adults, except those of Cocos specimens, in which case an adult male and an immature male were measured. The two Cocos males have larger bills than the Gala-

pagos males, a difference which strikes the eye instantly when looking over the series. The measurements of a female from Camden County, Georgia, in the collection of Mr. Joseph Grinnell, are included in the table.

In the Academy's series are six Galapagos specimens in juvenal plumage, and showing no signs of postjuvenal moult. They are as follows: No. 2064, Seymour, November 22; No. 2063, Charles, February 26; No. 2065, Hood, June 25; No. 2066, Indefatigable, July 16; No. 2061, Albemarle, August 11; No. 2058, Albemarle, August 31. Of these six specimens, three still have the remains of down attached to the feathers of the crown; viz., Nos. 2064, 2065, and 2058. The above series would seem to indicate that the breeding-season for the species continues throughout the year.

No. 2062, Cocos Island, September 4, 1905, is beginning to moult the juvenal plumage, pin-feathers appearing in the back and about the head and neck. I am unable to say whether the moult is the postjuvenal or the prenuptial. No. 2054, Albemarle, March 5, is evidently undergoing a similar moult, which likewise has not proceeded beyond the body-feathers, although it has been pretty well completed on the head and neck. The same remarks apply to No. 2060, Albemarle, March 5, and to No. 2059, Albemarle, March 10.

Three specimens are in a striped immature plumage, which evidently completely replaces the juvenal plumage, but whether by a postjuvenal or a prenuptial moult, I cannot say. In this plumage, pale-brown occipital plumes and dusky scapular plumes are present, and the black chin and throat of the adult are faintly indicated. Our specimens were taken as follows: No. 2057, Hood, September 29, 1905; No. 2056, Brattle, October 30; No. 2055, Indefatigable, November 20.

Birds with the black of the throat unbroken, but showing immaturity otherwise, were not uncommon. This immaturity usually took the form of a generally duskier and more brownish (rather than bluish) cast to the entire plumage, and also of more or less streaked under parts. No. 2052, Hood, June 25, is evidently passing from the plumage last described into this one. No. 2053, from Cocos Island, September 8, 1905, has white feathers intermingled with the black ones of the throat and chin.

No. 2030, a fine adult male from Cocos Island, is in fresh plumage and still shows numbers of pin-feathers. No. 2032 from Socorro, July 28, is in worn feather.

Butorides sundevalli: Galapagos Heron

Plate II, Fig. 2

Abingdon, Albemarle, Barrington, Bindloe, Champion, Charles, Chatham, Daphne, Delano, Duncan, Gardner-near-Hood, Hood, Indefatigable, islet off northeast James, James, Jervis, Narborough, Seymour, Tower, and Wenman islands.

This fearless, and to our minds ludicrous, heron frequented the rocky and cliff-bound coasts as well as those clothed with mangroves, its dusky color blending admirably with the lava rocks and rendering it very difficult to see, especially when not in motion. It was also observed quite commonly in the large saline lagoons near Villamil, Albemarle Island.

In two or three instances individuals were observed sitting on the bowsprit of the schooner while anchored at Tagus Cove, Albemarle Island. One day at Charles Island, upon returning from a short trip inland, we found an immature one in the bottom of the skiff, which was drawn up on the beach. It was quietly investigating the water under the grating. When we threw our things into the boat, it jumped up on a thwart, where it remained until one of the members of the party got a stick and dispatched it.

When a stone is thrown close to one of these birds, or it is come upon suddenly, it often jumps two or three feet to a neighboring rock, raising its crest and cackling and squawking in great alarm. Often if a person rows by one in a skiff at a distance of thirty or forty feet, it will make a great racket, craning its neck absurdly all the while—a habit which affords much amusement to the onlookers. When excited or disturbed, these herons bob their tails up and down continually with a short twitching motion.

Very often they were observed flying across bays and toward adjacent islands. They do not fly with the neck outstretched, but carry the head close to the shoulders, giving the body a hunched appearance. The same is true of their walk. One was watched carefully one day on Indefatigable Island. It

walked along, jumping from rock to rock and keeping hunched up all the time. Upon sighting its prey, it advanced slowly and stealthily, keeping behind rocks as much as possible until within striking distance, when suddenly its head shot forth and the fish was caught. On another day in the same locality I watched for fully ten minutes one trying to swallow a crab, and then had to leave without witnessing the conclusion. The crustacean was held crosswise in the bird's bill, and to all appearances was too large to be swallowed. Nevertheless the bird stood tenaciously in one spot, and made occasional unsuccessful gulps.

Enlargement of the sexual organs was noted in adults taken on Hood Island in September, on Indefatigable and Seymour in November, on Chatham in February, and on Abingdon in September. The sexual organs of two birds taken at Iguana Cove, Albemarle Island, on March 17 were small.

The only occupied nest discovered was in a mangrove thicket on a small islet at Sappho Cove, Chatham Island, February 10. It was about twenty-five feet from the outer edge of the thicket, and perhaps four or five feet above high water. It was composed of twigs, was not particularly bulky, and contained three greenish eggs, pipped and ready to hatch. Both of the adults were present and kept up a continual squawking while the nest was being examined. One stayed on the nest, except when approached very closely, when it would move away two or three feet, darting its bill at us continually.

On Narborough on April 18, I killed, with a stone, a young one which was just able to fly and fish for itself. Immediately its parent flew towards it screaming and with crest upraised. A similar instance was observed two or three days before at Banks Bay, Albemarle Island.

The Academy's series of adults exhibits a dichromatism. Three adult males from Chatham Island are of the pale phase, one (No. 2166 C. A. S.) extremely pale; a fourth male (No. 2137 C. A. S.) is rather intermediate, as is the only female from that island. A male (No. 2167 C. A. S.) from Banks Bay, and a female (No. 2168 C. A. S.) from Indefatigable, closely resemble the Chatham males. Throughout the series of adults there is considerable variation in color, most of the birds inclining to the dark extreme. From the Academy's

series and from the remarks by Mr. Ridgway,[1] it would appear that the extreme pale phase of this species is known only from Chatham, Indefatigable, and Albemarle Islands. In the extreme pale examples, the under tail-coverts are white or very pale gray with subterminal black spots, and there is a more or less distinct grayish-white postocular streak. The pileum and occipital crest are of the same color as in the dark phase, while the throat is white instead of gray. In many of the specimens of the dark phase the chin and throat have absolutely no white, but are pale gray mottled with darker gray. Breeding individuals of the pale phase seen at Sappho Cove in February had noticeably red tarsi and toes.

The series of young and immature birds shows considerable variation also. In the majority of cases the ventral aspect is dusky as described by Mr. Ridgway. Two specimens, however, from Cowley Bay, Albemarle Island, and from Narborough respectively, are noticeably white below. Some specimens have the terminal triangular white spot on the four outermost primaries as well as on the others. In very dusky examples the rusty shaft-streaks are lacking in the feathers of the pileum and occipital crest. In some specimens the back and scapulars are not of uniform deep sooty brown, but have broad cinnamon-rufous mesial stripes, and the wing coverts are similarly marked. No. 2144, Jervis, December 18, is an excellent example. No. 2152, Indefatigable, July 23, has narrow pale mesial stripes. No. 2148, Indefatigable, January 22, in which the juvenal plumage is not yet fully developed, shows beautiful green reflections on the feathers of the upper parts.

Two adults showing albinistic feathers were taken on Indefatigable Island in latter November. One had a white feather in the side of the neck, the other a white secondary. No. 2119, adult male, from south Albemarle, has the tertiaries a dark shining green, like the end of the tail, for about one quarter-inch at the distal end. This color is in the form of a terminal band. A similar terminal band, much interrupted, is formed by this color on the tail.

The Academy's series of skins of this species numbers 102. Forty-five adult males show the dimensions, in millimeters,

[1]Proc. U. S. N. M., v. 19, p. 605.

of that sex to be: Wing 176–198 (186); tail 57–71 (63); culmen 62–71 (67.3); tarsus 44.3–52.3 (48.6); middle toe 42.9–49 (45.6). Thirty-six females yield the following measurements: Wing 169–192 (183); tail 56–70 (63.8); culmen 58.1–69.2 (65.4); tarsus 43.4–51.2 (47.4); middle toe 39.3–46.5 (44).

Table X, p. 116, giving measurements of specimens by islands, shows that there is no variation in size with locality, but that obviously all the variation in size is individual. It cannot be correlated in any way with the color phases.

Birds in juvenal plumage showing no signs of moult were taken during nine months of the year, and consequently prove to a certain degree the wide range of the breeding-season of this heron. They were taken as follows: November 25, Indefatigable; December 18, Jervis; January 22, Indefatigable; March 24, Albemarle; April 18, Narborough; May 23, Charles; June 28, Hood; July 14 and 23, Indefatigable; September 22, Abingdon.

Birds in juvenal plumage with the renewal taking place chiefly in the scapular and interscapular regions were taken as follows: September 27, 1905, Gardner-near-Hood; October 24, Barrington; November 8, Indefatigable; November 22, Seymour; January 5, James; July 16, Indefatigable; August 11, Albemarle; September 22, 1906, Abingdon. No. 2163, Indefatigable, January 11, is somewhat farther along than the above specimens, and has a good many new gray feathers in the lower parts. No renewal seems to have yet taken place on the wings, the feathers being those assumed with the juvenal plumage.

A study of the Academy's series of adults reveals the two following points: The immature birds assume the adult plumage at the first prenuptial moult, which evidently involves the wings and tail as well as the body. The adults also have a complete prenuptial moult.

Butorides virescens: Green Heron

The Green Heron was not an uncommon bird on Cocos Island, Costa Rica, where a number were seen in the tall forest trees and along the streams in September, 1905.

August 8, 1913

The following table gives the measurements of seventeen specimens in the Academy's collection.

MEASUREMENTS (in millimeters)

Number	Sex	Age	Locality	Wing	Tail	Culmen	Tarsus	Middle Toe
18396	♂	Adult	Ohio	181	60	65.1	49.	44.2
13703	♂	Adult	California	195	66	60.8	49.9	46.6
13705	♂	Adult	California	198	61	57	50.8	46.5
13704	♂	Adult	California	196	73	62.2	50.5	46.2
12959	♂	Immature	California	201	68	61	51.7	45
12408	♂	Immature	California	193	66	56	50.9	45.6
2172	♂	Immature	Cocos	172	60	61.8	46.9	42.8
2173	♂	Immature	Cocos	180	63	59.8	49.4	42.5
2170	♂	Immature	Cocos	176	61	58.6	49.1	45.1
2169	♂	Immature	Cocos	174	59	55	49	45
13702	♀	Adult	California	201	70	56.5	49	45
12411	♀	Immature	California	198	67	59.1	50.6	45.8
12409	♀	Immature	California	185	65	56	50.1	44
12410	♀	Immature	California	192	64	52.5	51.7	46
12220	♀	Immature	California	192	67	56.3	49.3	44.6
2174	♀	Immature	Cocos	174	59	58.1	48.1	43.3
2171	♀	Immature	Cocos	177	61	56.3	50.5	47.8

The following summary of the above measurements shows that Cocos specimens average decidedly smaller than California specimens in length of wing and of tail, closely approaching the Ohio specimen in this regard. These averages are made without regard to age.

SUMMARY OF MEASUREMENTS (in millimeters)

Locality	Sex	Number of Specimens	Wing	Tail	Culmen	Tarsus	Middle Toe
Ohio.....	♂	1	181	60	65.1	49	44.2
California...	♂	5	197	67	59	50.8	46
Cocos.....	♂	4	176	61	58.8	48.6	43.9
California...	♀	5	194	67	56.1	50.1	45.1
Cocos.....	♀	2	175	60	57.2	49.3	45.5

Phœnicopterus ruber: AMERICAN FLAMINGO[1]

Plate III

Albemarle, Charles, Chatham, Indefatigable, James, and Jervis islands.

[1]Cf. Chapman, "A Contribution to the Life History of the American Flamingo (*Phœnicopterus ruber*), with Remarks upon Specimens," Bull. Am. Mus. Nat. Hist., v. 21, pp. 53-77.

Flamingoes were not abundant. Albemarle, Charles, and James seemed to be the most frequented islands, and about thirty was the largest number of birds seen in one flock at one time. On Indefatigable Island they were very scarce, only two being taken; and likewise on Jervis, where a young one was found in the small lagoon on the north side of the island. On Chatham Island a dead one was found on the shore of the tidal lagoon near the warehouse at Wreck Bay. This bird, we were told, had been brought over alive from Charles Island. The lagoon at the base of the precipitous mountain known as Finger Point, near Sappho Cove, Chatham Island, appeared to be a suitable one for flamingoes; but none were found there.

The salty coastal lagoons seemed to be the sole haunts of these birds. These lagoons are unaffected by the tides, and are therefore saturated solutions of salts, their shores often being paved with crystalline deposits. Their beds are usually composed of reddish mud, sometimes quite hard and firm. The shores, as a rule, are fringed with mangroves and salt-loving bushes, which in many cases grow in almost impenetrable thickets. Some of these lagoons are bounded by bare lava.

With only one or two exceptions, it was not difficult to get within shot-gun range of the flamingoes, and the discharge of a gun usually caused them to fly only a short distance.

Where the ground is clear, and the bird's movements are unimpeded by rocks and bushes, the flamingo is a good runner, being able to cover ground very rapidly, and giving a person a lively chase. At James Bay, James Island, a young bird not quite able to fly got through the bushes from the lagoon to the ocean beach. I pursued it for nearly half a mile south along the beach late one afternoon. I was, however, unable to overtake it before it reached the rocks at the end of the beach. Perceiving that it would be caught if it remained on the beach, the bird stepped into the water and struck boldly out from shore, swimming over an eighth of a mile. As soon as I left the beach, it returned and commenced walking up and down again in the attempt to find its way back to the lagoon. The following morning it had disappeared.

In the lagoons I have seen them walking both in long Indian files, and, when disturbed, in compact bunches. Early one morning we came upon a flock of twenty-eight in the lagoon at Cormorant Bay, Charles Island. The placid surface of the lagoon, overshadowed by a high and steep mountain on its southeast side and surrounded by rocks and trees, together with the beautiful roseate birds following one another in solemn procession the whole length of the lagoon, made a very attractive picture.

At a lagoon four or five miles northwest of Sullivan Bay, James Island, on July 28, an adult bird was found without flight feathers.[1] New ones were just appearing, which were very tender, bleeding profusely when bruised. This bird was a fast runner, racing up and down the smooth beach of the lagoon, until finally it was chased into a cul-de-sac. It tried to escape through the brush, but of course tripped and fell, bruising its wings, feet, and bill. It realized its inability to fly, for it did not make any attempt to use its wings until the very last. When carried under the arm it kept its head at a level with mine, and did not try to strike with its heavy bill, but simply looked at me wonderingly. This bird was taken aboard the schooner, where it had great difficulty in standing, owing to the rolling of the vessel. It managed to do so, however, by using its head and neck as a third leg. The same thing was noted later with the young. The head and neck are used in a like manner to assist a bird in steadying itself when arising from a sitting posture.

As compared with the adults, the young walked clumsily. In running in the shallow water as well as on the land, they kept their wings outspread, flapping them at each step, apparently balancing themselves by this means. I saw one stumble, and one youngster, partially in the down, stepped in a hole in the beach and broke one of its tarsi.

We first saw this species at Cormorant Bay, October 4, when three or four flocks of about a dozen birds each flew by the vessel, having been disturbed by some of the party who had gone ashore. They seemed to be all neck and legs when flying, as they carried those members stretched out horizontally. Their wing beats were not rapid, but were moderate

[1]Cf. Beck, Condor, v. 4, p. 99; v. 6, p. 10; Bonhote, Ibis, 1903, p. 310; Chapman, Bull. Am. Mus. Nat. Hist., v. 21, p. 76.

—being faster than those of the Great Blue Heron, but slower than those of the Bahama Pintail. When forced to fly from a lagoon, they usually circled about several times, apparently very reluctant to leave, and often settling again instead of flying off. They were seldom, if ever, seen in flight except when disturbed. Nevertheless they must move about considerably, for the numbers in the respective lagoons varied at different seasons, and in several instances varied overnight.

These birds were always observed feeding in the water, often standing in it up to and even above the lower edge of the feathered portion of the tibiae. In this position they feed upon the bottom of the lagoon, affording a strange spectacle with neither head nor legs in sight. Specimens were taken with the gullet full of what appeared to be reddish mud.

Nests of this species were found on Charles and James Islands, at Cormorant Bay on the former island and at James Bay and near Sullivan Bay on the latter. The nests were built of earth and mud scraped together into a pile with steep sides, sometimes being as much as a foot in height and the same in diameter across the top. Usually they were about seven or eight inches high. The depressions in the tops were about an inch or an inch and a half deep. The nests were always built near the water, either on some very low, flat, rocky islet or on a beach. On the east side of the lagoon at James Bay, there were thirty-five nests on the narrow beach at the edge of the brush. Twenty-five were strung along close together, and a few feet to the northward were ten more. When we visited that locality in early August many of them showed signs of recent use, to which the presence of the young birds also testified. Some, however, had not been occupied that year. About a dozen addled eggs were found, one to a nest, while the remaining nests were vacant. On our previous visit in December there were no eggs, so without a doubt these were laid in 1906. Evidently at least a third of the eggs laid in that locality during that year were infertile.

At Cormorant Bay, on February 25, we found six mounds of earth between four and eight inches high, each with one fresh egg. They were on a low lava-islet in the northeast corner of the large lagoon. No nests were found with lining other than mud and earth. A seventh fresh egg was laid on

a level bit of lava rock, with mud half an inch deep scraped around it. The birds all left when approached within thirty yards.

In a lagoon about four miles northwest of Sullivan Bay, on July 28, nine unoccupied nests were found, seven of which were on a small, low, lava-islet, the remaining two being on the adjacent mainland. They were built in the usual style, but were, however, only four or five inches high. An addled egg was found in one. Undoubtedly the nests of the flamingoes in the Galapagos Islands are not endangered to any great extent by the rise of the water, as are the nests of their Bahama relatives; hence, perhaps, many are built very low.

The following notes were made at James Bay in August: August 6, there were twelve flamingoes in the lagoon, one adult and eleven young, three of the latter being large enough to fly. The remaining eight still showed more or less down. Two or three dead young with nearly straight bills were found. They were considerably younger than the ones taken. Two full-grown young were feeding apart from the others. They were approached quite closely and photographed, proving less wary than the adults. August 7, an additional adult had arrived during the night. One of the larger young birds was observed to go through a strange performance; it seemed to be butting an adult. They were all on the beach at the time. The young one would lower its head and bump against the adult with its shoulders; the latter paid very little attention, merely trying to get out of the way. The performance was kept up for about five minutes. Was the young bird begging to be fed? I had seen it feeding itself—in fact they all seemed to do so, the young apparently being left to themselves most of the time, judging from the absence of the parents. August 8 revealed four adults in the lagoon. There were two lagoons south of the one here mentioned, but they did not seem to be used by the flamingoes for breeding purposes.

The chief associate of the flamingo was the Bahama Pintail, while the Black-necked Stilt ranked second.

The colors of the naked parts in life were as follows:

Adult—Terminal third of bill black; remainder of mandible whitish tinged with scarlet; remainder of maxilla, throat, and skin in front of the eyes whitish; orbital ring buff; iris straw-

yellow; tarsus and toes scarlet; under side of toes and webs flesh-colored. Maxillæ of very high-plumaged adults are tinged with scarlet from the black of the anterior portion to the posterior end of the nostrils.

Juvenal plumage—Iris dark brown; orbital ring olive-buff; bill olive-buff, tipped with plumbeous; skin in front of eyes and throat cinereous; tarsus and toes olive-gray, blackish slate at joints; under side of toes and webs mouse-gray. As the birds age the tip of the bill becomes darker.

The Academy's series of flamingo skins, all from the Galapagos Islands, numbers seventy, and includes specimens taken in every month of the year except March, April, and June.

The series of young birds is passing into the plumage called by Mr. Chapman the "third or juvenal plumage."[1] The youngest bird matches No. 3 of Fig. 16 of Mr. Chapman's paper. As the grayish-brown down disappears from the tips of the feathers of the under parts, the pale pink plumage is more clearly disclosed, showing many of the feathers on the breast and flanks with dark shafts. By lifting the feathers of the under parts, the gray downy teleoptiles can be seen. The youngest bird shows these very distinctly. With the next moult these become paler, and in birds fully adult are white. The feathers of the upper parts, particularly the scapulars and interscapulars, show wear very quickly, for even in the youngest bird they are somewhat abraded. Pale pink feathers put in an appearance on the head, whence they seem to work by degrees down the neck, appearing here and there and giving it a pink-and-gray mottled appearance. At this stage the scapulars and interscapulars are much worn and pointed, and the primaries are developed enough to enable the bird to fly. All of the young thus far mentioned were taken at James Bay, August 6 to 9, showing that there must be considerable variation in the time of egg-laying in a colony. No. 2236, James Island, December 26, is in very much worn and faded juvenal plumage, but shows no signs of moult.

Two specimens (No. 2234 from Jervis Island, December 18, 1905, and No. 2237 from James, December 28, 1905) are moulting from the juvenal or third plumage into a fourth plumage—not the full adult plumage, however, but a pink

[1]Bull. Am. Mus. Nat. Hist., v. 21, p. 72.

plumage with dusky mesial stripes on many of the feathers of the upper parts. These two specimens also show pink feathers replacing the worn faded feathers of the head and neck, and apparently working from the head downward. The bases of the new feathers appearing in the head and neck are gray as in the juvenal plumage, and not white as in fully adult specimens. No. 2232, October 5, and No. 2238, February 26, both from Charles Island, seem to show this fourth plumage somewhat farther advanced. Scarlet upper wing-coverts, occasionally with dark shafts, are appearing, and pink feathers are replacing the worn, faded feathers of the under parts. Pinkish-white feathers are also taking the places of the long bicolored scapulars, and new upper tail-coverts are appearing. No. 2238 shows the old and new upper wing-coverts in alternating rows. No. 2208, south Albemarle, May 1, is still farther along, yet shows outward signs of immaturity in the wing-coverts, scapulars, tertials, upper tail-coverts, tail, and the dark color of the naked parts. Many old worn feathers of the third plumage are still to be found in the neck, hidden beneath the new feathers, which, as mentioned above, have dark bases. To sum up, the five immature birds just discussed are all in moult, apparently from the juvenal plumage to a plumage superficially adult, but distinguished from the full adult plumage by its paleness, by the dusky bases of the feathers of the head and neck, by the dark shafts of the axillaries, and by the more or less frequent occurrence of dorsal feathers with a dark mesial stripe or at least a shaft partially dusky subterminally. For the sake of convenience this plumage will be spoken of as the fourth plumage.

The following table gives the measurements in millimeters of all the young and immature specimens, referred to in the foregoing account, arranged according to age, as apparently indicated by the plumage.

MEASUREMENTS OF IMMATURE BIRDS (in millimeters)

Number	Date	Island	Sex	Wing	Tail	Culmen	Tarsus	Middle Toe and Claw
2203	Aug. 6, 1906	James	♂	145		93	139	71
2200	Aug. 9, 1906	James	♂	203		95	142	72
2202	Aug. 7, 1906	James	♀	241	49	99	154	69
2231	Aug. 7, 1906	James	♀	244	37	99	153	68
2230	Aug. 8, 1906	James	♀	261	50	102	145	70
2204	Aug. 7, 1906	James	♀	322	69	113	157	70
2205	Aug. 7, 1906	James	♀	305	74	111	167	73
2206[1]	Aug. 8, 1906	James	♀	367	106	118	190	86
2201	Aug. 7, 1906	James	♀	340	99	115	177	77
2233	Aug. 6, 1906	James		361	112	114	180	75
2235	Aug. 7, 1906	James	♀	348	95	119	183	76
2236	Dec. 26, 1905	James	♂	361	111	115	187	77
2234	Dec. 18, 1905	Jervis	♀	359	114	113	202	73
2237	Dec. 28, 1905	James	♀	368	112	118	190	80
2232	Oct. 5, 1905	Charles		353	102	111	215	76
2238	Feb. 26, 1906	Charles	♀	367	107	116	252	78
2208	May 1, 1906	Albemarle	♂	408	123	127	295	90

Birds showing the fourth plumage, usually mixed with either the third or the fifth, are common in the Academy's series, and have been included in the measurements of adults, for to all outward appearances they are adult. Occasional specimens in this plumage have dark edges to the rectrices, but this was also noted in one full adult. I am not prepared to say positively whether the primaries of this fourth plumage are those of the third, but apparently they are, as are also the axillaries. Just how long a time elapses between the hatching of the chick and the assumption of the adult plumage is hard to say, as the birds evidently breed at different times of the year on different islands, making it exceedingly difficult to judge from a series of skins alone. However, I believe that the full adult plumage is assumed at the first postnuptial moult.

Nineteen specimens in the Academy's collection show the fourth plumage in some stage. One October specimen from Charles Island retains tertials of the third plumage, and has worn feathers of that plumage hidden beneath the feathers of the neck. Otherwise it is in worn fourth plumage, with new feathers of the fifth plumage putting in an appearance in the

[1]No. 2206 has not lost the down from the tips of the feathers of the breast, yet it is a larger bird than No. 2201, which has lost it.

interscapular region and on the breast. The axillaries are dark-shafted and worn, and are evidently retained from the third plumage. Another October specimen from Charles Island is in almost complete fresh fifth plumage, including axillaries, but still shows a good many dark-based feathers in the neck and worn feathers in the back. Four other Charles Island specimens, taken in early October, are in transition also; the two individuals just mentioned, however, give the extremes. It would seem from the second individual, that some specimens at least attain the full adult plumage in latter October or November. Other transition birds, some showing remains of the third plumage in the neck, were taken in January, February, May, and July. No. 2196, male, James Island, July 28, is assuming the fifth or adult plumage—new abdominal feathers, axillaries, primaries, upper wing-coverts, and rectrices are appearing, the primaries and rectrices not being full grown. Elsewhere the moult is in progress. The new axillaries have red instead of dusky shafts, a characteristic of the adult bird. Evidently the first loss of the primaries occurs during the moult from the fourth to the adult plumage. One specimen, No. 2225, has an abnormal black feather at the base of the neck; this feather belongs to the fourth plumage. It would seem that the plumage which I call fourth is either the postjuvenal or the first prenuptial, and is obtained by a partial moult. The fifth plumage is evidently the first postbreeding plumage.

Thirty specimens are fully adult. The feathers of the head and neck have white bases, the axillaries have red instead of black shafts, the body-down is white, and, in some February, July, and August specimens, the lower mandible is tinged with red just posterior to the black of the outer third. These thirty specimens were taken in October, November, December, January, February, July, and August.

Three October specimens from Charles Island are worn, and exhibit feather-growth in the head, neck, back, breast, and abdomen.

No. 2187, Indefatigable Island, November 25, is in worn faded plumage. New feathers, paler than normal, are appearing in the head, neck, back, and lower parts.

Of three specimens from James Island, taken in latter December, one is a female in fine fresh plumage save for a few old scapulars and interscapulars, which are being replaced. The other two specimens are worn birds in process of moult, one being also much faded. The new feathers appearing in this bird are abnormally pale.

This brings us to a fine male taken on southern Indefatigable Island on January 11. This bird has pretty well renewed its plumage, although the moult is still in process on the back and in the tail. Both wings show the primary coverts being renewed, while in the right wing the two outer primaries are lacking, and new ones are just appearing, still enveloped in their sheaths. This is evidently not a normal state, and it may have been brought on by an accident.

Fourteen adults were taken on Charles Island on February 26. These all show some wear in varying degree, but apparently very little fading; for the color of the breast and lower neck is much intensified in some by the wearing away of the pale margins of the feathers, leaving them pointed instead of rounded. Some specimens show remnants of the previous plumage. One or two others show a few new feathers appearing in the back and breast, either belated arrivals of the present plumage or early heralds of the next plumage.

Seven specimens from James Island, taken in late July and early August, show new feathers, and seem to be coming into full fresh plumage (undoubtedly the postbreeding), although they are by no means all at the same stage. Two are much faded, and, as in other very pale specimens, the new feathers appearing in the neck, breast, and back are paler than normal. Both have worn red feathers at the base of the fore-neck, among which new pale feathers are appearing in conformity with other new pale feathers. One specimen also exhibits a large amount of red on the lower mandible. The other specimen shows some new pinkish white feathers appearing among the bright red ones of the abdomen. In pale specimens the wings and tail seem to be normal in coloration, and four such specimens show patches of worn red feathers on the lower fore-neck. The pallor elsewhere is not that of immaturity, for the birds are fully adult.

One specimen, taken on south Albemarle on September 3, is in about the same stage as some of the July and August birds from James, in which the moult is well along.

From the evidence given above, it appears that in adults the plumage is entirely renewed during the latter half of each year after the breeding season,[1] which occurs in the first half of the year.

The measurements (in millimeters) of twenty adult males and twenty-three adult females yield the following extremes and averages: Males—Wing 381–439 (413); tail 122–154 (139); culmen 117.4–132.3 (125.6); tarsus 253–322 (295); middle toe 80–91.9 (86.4). Females—Wing 370–412 (384); tail 120–143 (132); culmen 115–126 (119.5); tarsus 241–306 (258); middle toe 73.9–89 (77.9).

Five fresh eggs from Charles Island measure in millimeters as follows: 83.5×50.9, 87.3×52.4, 89.4×51.1, 85.8×52.6, 86.9×52.5. They all fall below the average given by Mr. Chapman for ten eggs from the Bahama Islands—90.2×53.9.[2]

Pœcilonetta bahamensis: Bahama Pintail

Albemarle, Barrington, Charles, Chatham, Duncan, Hood, Indefatigable, James, Jervis, and Seymour islands.

The Bahama Pintail was common on Albemarle, Charles, Chatham, Indefatigable, James, and Seymour islands, as many as one hundred being seen together on south Albemarle. Other expeditions have reported them from Barrington, Duncan, and Hood islands, localities in which they were not observed by us. In the crater-lake at Tower Island, four ducks were observed swimming about, but as I was on the rim of the crater two or three hundred feet above them, they could not be positively identified.

The species was most common about the salt lagoons of the low coastal regions, where it associated largely with the American Flamingo and the Black-necked Stilt, and, to a lesser degree, with the Sooty Gull, the Blue-winged Teal, the Egret, and the Galapagos Heron. It also frequented the fresh-water

[1] "Mr. G. M. Green of San Francisco reports having found the flamingoes breeding in the salt marshes about James Bay on James Island, and he obtained eggs in August." (Snodgrass & Heller, Proc. Wash. Acad. Sci., v. 5, pp. 253, 254.) It is not stated whether the eggs were fresh. Those found by the Academy expedition at James Bay in August, 1906, were addled.

[2] Bull. Am. Mus. Nat. Hist., v. 21, p. 61.

ponds and lakes in the elevated portions of some of the islands. Only once were any seen on tidal water, and that was when a pair alighted in a quiet cove about three miles west of Cape Rose, Albemarle Island. Often they were noted sitting about on small lava islets and rocks in the lagoons, standing on one foot a good part of the time.

The haunts of these ducks must vary, as the smaller lagoons and ponds often dry up. In November, thirteen were encountered in a lagoon on South Seymour, where during the following July only the dry bed of the lagoon was to be seen. Sometimes one or two ducks would be seen in a locality, while at a later or an earlier visit they were more abundant—all this going to show that they must move about from place to place. In fact, on several occasions they were observed in flight along the coasts, usually, however, only one or two at a time.

In a flock seen at South Seymour in November, males were noted chasing each other, apparently in jealousy, and sometimes one would chase a female. Some low quacking is heard during the mating season, and it was particularly noted at Charles Island in February.

The following remarks on the reproductive organs tend to show a long breeding-season:

October 5 and 6, Cormorant Bay, Charles Island. Two males with swollen testes.

November 6, Academy Bay, Indefatigable Island. A female with enlarged ovary.

January 11, south Indefatigable. Four skinned, all but one having enlarged genital organs.

July 28, four miles northwest of Sullivan Bay, James Island. Nine taken with large genital organs.

We never found what was beyond doubt the nest of this species. At Cormorant Bay on February 25, a single fresh egg was found on the bare rock of a low lava-islet in the large lagoon at that place. Stilts and flamingoes were nesting on the same islet.

Young in the down were observed only near Villamil, Albemarle Island, in the salt lagoons about the cultivated lowlands. On March 5 a parent bird was noted swimming with three or four downy ducklings, and on the 6th several more young were seen. Four days later a few were encountered in

another lagoon accompanied by both parents. They kept well to the center of the sheet of water when they perceived us, traveling just as fast as their feet could propel them. Half a dozen ducklings, accompanied by their mother, were discovered in another pond about half a mile inland on August 24. As she swam out from the mangroves, they tailed after her. The above dates point to two broods being hatched during a season, or else to a wide range of time in the breeding-season in one locality.

For the most part these ducks were fearless, and usually would swim towards a person, sometimes close enough to be killed with a stone. After the first discharge of a gun, those of a flock not killed or injured would sit on the water bewildered, thus giving ample time to reload. Sometimes they flew off a short distance and occasionally circled close to the hunter. On Charles and Chatham islands they were somewhat wary at times, perhaps because of persecution by the natives. They were also cautious when in charge of their young. In one case, when the parent observed me, it led the ducklings into some thick grass, and then came out and swam back and forth in an obvious effort to decoy me from them.

A drake, caught on Seymour Island in November, and kept alive a couple of weeks in a cage, was accustomed to hiss at me every time I approached, and he would also threaten to bite.

In living specimens, the space on each side of the upper mandible near its base is yellowish or orange in the female, and reddish in the male, being brightest in the breeding-season. In the male, at least, some of the redness is perhaps caused by blood, for when pressed the patch loses its red color just as does one's finger when squeezed. The reddish color returns in a like manner when the pressure is removed.

In some males, notably No. 2287 C. A. S., the dusky grayish-brown feathers of the upper-back are trisected by two transverse bars of pale brown, the outer one distinct, the inner one less so. In other males and all the females, these feathers are dusky grayish-brown with paler margins, usually without transverse bars, or with only the outer one faintly indicated.

In four specimens taken on south Albemarle on November 1, the postjuvenal or the first prenuptial moult is started. The juvenal plumage is a very weak washed-out copy of the usual plumage of the female.

Cases of partial albinism are not infrequent in this species. The several examples in the Academy's series show white feathers among the colored ones at the base of the neck and on the breast.

A number of specimens have a distinct rusty wash on the tips of the feathers of the breast and abdomen.

The females average somewhat smaller than the males, as shown by the following extremes and averages in millimeters, which are condensed from the measurements of forty-five males and thirty-five females, all from the Galapagos Islands: Males—Wing 190–215 (203); tail 72–94 (83); culmen 40–45 (43); tarsus 31.1–36 (33.1); middle toe 37.5–43.9 (40.4). Females—Wing 180–202 (192); tail 67–81 (72); culmen 37–43.4 (40.1); tarsus 29–33.7 (31.3); middle toe 36–40.5 (38.1).

The single egg of this species taken on Charles Island measures 51×35.1 mm.

Querquedula versicolor: Brilliant Teal

In a nominal list of the Galapagos birds brought home by the Swedish Frigate "Eugenie," Professor Carl J. Sundevall includes *"Anas maculirostris."*[1] The "Eugenie," while on a voyage round the world, visited the islands in May, 1852, with Dr. Kinberg as zoologist and surgeon of the expedition.

There is apparently no other record of this species from the Galapagos Islands.

Querquedula discors: Blue-winged Teal

Albemarle and Chatham islands.

The presence of the Blue-winged Teal in the Galapagos Islands was first detected on February 8, 1906, by Mr. Beck, who saw nine in the company of a flock of Bahama Pintails in a pond above sixteen hundred feet elevation on Chatham.

[1] P. Z. S., 1871, p. 126.

They were quite wild, and flew upon close approach, while the native ducks remained.

Three were next seen by Mr. Hunter on March 6, as they were flying about the large salt lagoon near Villamil, Albemarle Island. On August 22 a male and a female were seen three or four times during the forenoon in that locality. They were very wary, however, and always kept out of shot-gun range. The next day a very long wing-shot brought down a drake. A little later in the day half a dozen were found feeding in a lagoon about half a mile from the sea, and a second bird was shot, but lost in a mangrove thicket. The people at Villamil readily distinguished this species from the Bahama Pintail, and had a name for each. They said that the Blue-winged Teal occurred there regularly every year.

The drake (No. 2336 C. A. S.) taken on August 23 was in practically full plumage, including new primaries. The rectrices and many of the feathers of the abdomen, however, were old and worn.

On August 10, 1905, a wing-tipped female Shoveller (*Spatula clypeata*), No. 2337 C. A. S., was shot in the brackish lagoon of Clipperton Island, Mexico. The specimen was in moult, new feathers appearing in the breast, abdomen, crissum, rump, and back. The primaries had not been moulted.

According to Mr. Beck, ducks occur in considerable numbers at Clipperton Island during the northern winter. He visited the island on November 19, 1901. "Several hundred ducks were seen, the majority being of the following species: *Dafila acuta* (Pintail); *Mareca Americana* (Bald pate); *Querquedula discors* (Blue-winged Teal); *Spatula clypeata* (Shoveller); and a single *Fuligula vallisneria* (Canvasback)." He also reports seeing two specimens of *Fulica americana*. On Cocos Island, Costa Rica, on January 26, 1902, he shot one *Querquedula discors* and saw two more.[1]

Nannopterum harrisi: FLIGHTLESS CORMORANT

Plate IV

Albemarle and Narborough islands.

With a more restricted range than any other water-bird in the archipelago, the Flightless Cormorant frequents the coast

[1]Condor, v. 9, p. 110.

of Narborough Island and the adjacent coast of western Albemarle. We saw it commonly about the east coast of the former island, and at Banks Bay on the latter. At Tagus Cove two were seen, one on April 7 and the other on April 19. We never saw as many together at one time as we did of the penguins at Iguana Cove, the limit being less than a dozen. The extreme lack of wariness of these birds will probably cause their total extinction when man more commonly frequents this portion of the archipelago. Their small numbers and their much restricted habitat would seem to indicate that they are on the verge of extinction.

As the name denotes, these creatures are flightless; and we never observed them attempt to fly even when hard pressed. While sitting in their usual upright position, the wings are often held half spread and away from the body, as shown in plate 10, volume 9 of *Novitates Zoologicae.*

They are expert swimmers and divers. In diving, the bird acts differently from the Galapagos Penguin; for instead of merely submerging itself like a seal, it makes a sort of jump, throwing its head and neck forward at the same time, disappearing head first. One bird, when finally driven from its nest, swam under water very swiftly for fifty feet or more.

When it comes to progression on land, however, they are not so agile, their large bodies and short legs greatly impeding their progress. On level ground they waddle, but where rocks or other obstacles are in the way, they proceed by short jumps, keeping in an upright position all the time. They were seen to jump up on rocks six or seven inches high, but sometimes had to make two or three trials before getting over difficult places. Upon leaving the water they always stood and shook themselves. It was not uncommon to see several sitting upon some black lava-point or islet, usually near their nests.

On land they were easy of approach, and one could usually walk up to them and kill them with a stick. On the water they were warier, but were usually approached within shotgun range. We observed none in the surf as reported by other visitors, for the simple reason that there was no surf at the time of our visits.

August 8, 1913

Their weapon of defense is the bill, which they can use very effectively. One bit a member of our party on the breast, cutting through his shirt and drawing considerable blood. A number were carried alive in sacks from Narborough to Tagus Cove. Holes were cut in the sacks, allowing their heads and necks to protrude; each sack became a veritable Hydra. When they were not biting each other in their rage, they were making vicious passes at us with their long snake-like necks. At the nest, both birds were usually loyal to each other, and put up a good fight against the intruder. Once or twice the mate of a bird at the nest was observed to come out of the water and climb laboriously up to its nest, and, finding an enemy there, valiantly help to defend it.

These cormorants were seen swallowing fish upon coming to the surface after a dive. An eel fourteen inches long was taken from the gullet of one bird.

In sleeping, they throw the body forward slightly from the usual upright position, and place the head and neck over the shoulder, thrusting the bill down the side of the body under the secondaries. One of the most ridiculous sights I saw in the Galapagos Islands was one of these clumsy creatures scratching its head. Balancing itself on one foot, it carefully lowered its head so that it could reach it with its free foot, and proceeded very solemnly to scratch for perhaps half a minute.

When on a visit to southeastern Narborough on March 22, a bird was observed pursuing another about a small tidal lagoon. Perhaps this was a case, similar to that mentioned by Messrs. Snodgrass and Heller,[1] of a young bird pursuing an adult for food, although in this instance it was not successful. They were heard to utter two or three harsh croaking notes.

On April 16th at Banks Bay, several were seen, and two pairs were found with nests without eggs situated at an elevation of about ten feet in a sandy place just back of the black lava of the shore. There were three nests about three feet apart, one an old one, and all placed close to a small cactus. A fourth was seen some fifty yards away, also in the sand. The nests with birds at hand were mere depres-

[1]Proc. Wash. Acad. Sci., v. 5, p. 250.

sions in the sand, lined around the edges with a few sticks and seaweed, some of which was fresh. The owners held their ground resolutely, opening their mouths at us menacingly and uttering harsh guttural croaks. The voices of both males and females seemed to be alike.

On northeastern Narborough on April 17, 18, and 19, two colonies were found nesting—three pairs in one colony, and four or five in the other. In the first colony, two sets of three eggs each were taken; and in the second, one set of two. In each set there were one or two fresh eggs, and one or two with incubation begun. The nests were of sticks and seaweed, mostly fresh, and were placed on the bare black lava about ten feet above the water. In both instances the nesting-place seemed also to be the haunt of sea iguanas. The nests were five or six inches high at the rim, with a depression an inch deep in the center.

Parasitic worms were found in the alimentary tracts of several birds.

The colors of the naked parts of breeding adults were as follows: Iris bluish green; feet black; lower mandible drab-gray; upper mandible slate-color, drab-gray at tip; gular sac drab-gray, with whitish dots; lores dusky with parallel longitudinal ridges of pale dots.

All of the Academy's skins, which were taken in March and April, are in fresh body-plumage, and many—particularly birds taken in March—show pin-feathers and newly expanded feathers. The wings and tails of all are more or less worn, and in almost every case new rectrices are appearing; new remiges, however, are not so common. With one exception, all of the specimens have filoplumes on the sides of the head, and similar white filoplumes are to be found hidden among the body feathers, particularly those of the under parts.

One specimen was found with a white feather in the tibia, another with one in the back, and still another with two in the back.

A dark-brown specimen, No. 2358, without filoplumes, was taken on Narborough on March 22. The middle rectrices are fresh, the others much worn. The wings are also worn, but the body-plumage has been pretty well renewed. The old feathers still remaining in the breast are very soft and downy.

In fact the whole plumage of the under parts is softer than that of adult birds.

MEASUREMENTS (in millimeters)

Number	Sex	Length	Extent	Wing	Tail	Culmen	Tarsus	Outer Toe
2354	♂			185	145	75	65	105
2355	♂			192	144	83	68	112
2356	♂			190	146	80	66	111
2357	♂			201	160	79	70	110
2358	♂			196	147	77	65	101
2360	♂			190	142	78	65	107
2364	♂			189	145	82	65	115
2365	♂			198	160	90	67	115
2368	♂			200	150	89	68	115
2369	♂			193	156	77	65	115
2373	♂	1000	840	192	140	80	68	110
2376	♂			197	147	83	65	104
2378	♂			186	156	85	72	112
2359	♀			188	149	76	59	101
2361	♀			175	142	75	55	95
2362	♀			181	142	82	57	97
2363	♀			176	145	73	56	97
2366	♀			177	144	75	61	98
2367	♀			176	145	73	58	102
2370	♀			180	139	75	60	101
2371	♀			178	138	76	60	99
2374	♀	830	730	178	140	69	57	97
2375	♀			187	147	80	65	103
2377	♀			176	147	76	57	97
2379	♀			182	145	77	60	103
2380	♀	910	735	196	156	73	61	98
Average	♂			193	149	81	67	110
Average	♀			181	145	75	59	99

The three sets of eggs taken by the Expedition measure in millimeters as follows: 64×39, 66×40.5, 69×41; 59.5×40.5, 63×44, 65×44; 69×42, 70×42.

Sula cyanops: Blue-faced Booby

The Blue-faced Booby is one of the common boobies of the eastern tropical Pacific north of the Galapagos Islands. The Academy's expedition first encountered it on July 23, 1905, in latitude 20° 59′ North, longitude 111° 57′ West. The last one noted on the southward voyage was seen on August 18 in latitude 7° 24′ North, longitude 103° 52′ West. During a stiff blow off Clipperton Island, Mexico, I noted an immature one on the water exhausted.

At San Benedicto, Revilla Gigedo Islands, the species was common and nesting on July 26, 1905, eggs and naked young being seen. At Clipperton Island on August 10, there were large colonies scattered about among the Brewster's Boobies, but none were nesting.

On the northward voyage the species was first noted on September 29, 1906, in latitude 9° 22′ North, longitude 98° 25′ West, when half a dozen immature birds with brown heads were seen singly during the day. Individuals of this species, usually immature, were seen almost daily until October 25, latitude 19° 53′ North, longitude 118° 1′ West.

Life-colors of naked parts of brown-headed immature birds are: Bill olive-buff; gular sac and face dark plumbeous with light spot under eye; feet cinereous with toes olive-buff on under side.

Life-colors of naked parts of adults: Bill straw-yellow; gular sac and face bluish black with light spot under eye; feet lavender, toes edged with olive-buff.

In the following table are the measurements of thirteen adults taken by the Expedition.

MEASUREMENTS (in millimeters)

Number	Sex	Locality	Wing	Tail	Culmen	Tarsus	Middle Toe
2381	♂	10° 20′ N., 108° 44′ W.	423		106	54	77
2383	♂	Vicinity of Clipperton		170	99	52	73
2384	♂	Vicinity of Clipperton			106	54	76
2385	♂	Vicinity of Clipperton	426	177	102	55	77
2387	♂	10° 20′ N., 109° W.	418	176	103	54	78
2388	♂	Vicinity of Clipperton		176	100	51	73
2398	♂	Vicinity of Clipperton	414	178	102	54	76
2382	♀	10° 20′ N., 109° W.	428	176	100	54	75
2386	♀	19° 37′ N., 111° 11′ W.	440	181	100	57	79
2389	♀	Vicinity of Clipperton		180	104	53	80
2390	♀	13° 28′ N., 108° 52′ W.		173	103	54	77
2391	♀	10° 20′ N., 108° 44′ W.		185	106	57	79
2392	♀	Vicinity of Clipperton	428	187	103	57	79

Sula piscatrix: Red-footed Booby

Plate V, Fig. 1

Abingdon, Bindloe, Culpepper, Gardner-near-Charles, Hood, Indefatigable, Tower, and Wenman islands.

This booby, the boldest and most inquisitive of the five species met with on the Expedition, was found commonly at Culpepper, Tower, and Wenman islands. One example was observed close to Gardner-near-Charles on October 3, 1905, and one near South Abingdon on September 22, 1906. On September 14, 1906, I noted two about twenty miles south of Tower Island. None were encountered at Hood Island, where Messrs. Snodgrass and Heller found them nesting in May.[1] One in the dark phase was seen south of the archipelago on June 15, in latitude 2° 17′ South, longitude 90° 58′ West. Most of the birds seen in the Galapagos Islands were in the dark phase, although a number in the light phase were noted at Culpepper, Tower, and Wenman islands—chiefly at Culpepper. Birds in all sorts of pied or intermediate stages were observed. At Cocos Island, Costa Rica, birds in the light phase or in pied stages were very rare, even more so than in the Galapagos Islands.

In 1905 the northernmost locality in which we saw the Red-footed Booby was latitude 20° 59′ North, longitude 111° 57′ West, on July 23. This was in the general vicinity of San Benedicto, Revilla Gigedo Islands, where the light phase of the species occurs commonly. After leaving San Benedicto the species was next met with in latitude 5° 43′ North, longitude 98° 44′ West, on August 23, when a bird in the dark phase was seen. Another was seen on the 24th, one on the 28th, and two on the 31st. On September 1st, when in the vicinage of Cocos Island, they became common; all were in the dark phase.

In 1906, from the time we left Culpepper Island on September 25, until we were in latitude 19° North, longitude 116° 41′ West, on October 24, Red-footed Boobies were seen daily with but two exceptions. The first individual in the light phase was seen on October 7, in latitude 14° 38′ North, longitude 109° 12′ West, after which they were seen with more or less frequency, particularly in the vicinity of Clarion Island, Revilla Gigedo group. Judging from the dull colors of the naked parts, practically all of the birds of the dark phase seen after leaving the Galapagos group were immature. An occasional immature bird with pale under parts was encountered.

[1]Proc. Wash. Acad. Sci., v. 5, p. 247.

At Tower, Wenman, and Culpepper islands, Red-footed Boobies were sitting in the bushes and low trees both singly and in pairs. In one or two cases a white adult was seen in company with a gray adult. The nests were composed of loose sticks placed in a bush or low tree. On Tower Island, the nests were found all over the island, and two or three fresh eggs were seen on September 15. Only an occasional bird, however, was found on a nest. On Wenman Island, on September 24, the majority of the birds seemed to have no nests, but were simply sitting about in the trees and bushes. No eggs were discovered. A young bird just able to fly was taken on Wenman, and one was seen on Tower.

Three females taken forty miles south of Cocos Island on September 2, 1905, had large ovaries. At Cocos, the birds were very common on the wing and in the trees growing along the rocky precipitous shores. In the forest I noticed several breaking off twigs for nests. On September 13 Mr. Beck took a fresh egg from a nest in a small tree on a rocky island occupied by a nesting colony of Brewster's Boobies.

When a bird alighted at its nest or beside its mate, it craned its neck and, swinging its head from side to side, uttered a long, harsh, cackling call consisting of a short guttural note repeated fifteen or twenty times in quick succession. This call resembled somewhat the call given by the Man-o'-war Bird when on the nest, only that it was harsher. At Cocos Island the birds in the trees kept up a continual loud cackling noise.

When these boobies were asleep or pluming themselves in some tree, a person could walk right up to them before being noticed. They usually straightened up with a startled expression, often uttering a short squawk of surprise. If one continued to disturb them they would squawk vociferously and try to fly away, frequently floundering about among the branches.

The flight of the Red-footed Booby is more graceful than that of the Blue-faced and the Peruvian, and somewhat resembles that of a large shearwater. When in the vicinity of Cocos Island and of Clarion Island, flocks of Red-footed Boobies were seen flying away from the islands in the morning and towards them in the evening. The flocks contained from six to fifteen birds. The birds fly with the same gentle, wave-like

rise and fall that characterizes the flight of other members of this genus. The wing-strokes occur on the rise; on the downward swing the bird sails, in calm weather often going several yards very close to the surface of the water. The members of a flock are practically synchronous in every action.

In fishing, the Red-footed Booby pursues the same tactics as the Blue-footed, diving, with wings half closed and rigid, from a height of twenty or thirty feet. On one occasion, however, I saw one catching flying-fish on the wing by swooping into schools which were skimming along above the water.

Over half of the Academy's series of fifty-eight skins is made up of adult birds. Some of these, in the dark phase, show new dusky feathers replacing old, faded, dusky feathers.

In No. 2440 (male, dark phase, from Cocos), the bill has dried of a bright-red color. This bird has the black gular sac and is evidently adult. In most cases the bill dries mainly of a dusky bluish black.

The colors of the naked parts of a freshly-killed adult dark-phase bird were as follows: Bill pale blue, except at base, where it was peach-blossom pink; skin around eyes azure blue; gular sac black; feet poppy-red.

The colors of the naked parts of a freshly-killed brown-plumaged immature bird were as follows: Bill brownish with pinkish blotches near base; skin around eyes dark blue; gular sac French-gray, blackish at posterior edge; feet dull pinkish with dirty bluish shade in webs.

The colors of the naked parts of a freshly-killed immature bird with pale under parts were as follows: Bill pale bluish and pinkish with dark tip; skin around eyes blue; gular sac pale blue with black along sides next the mandibular rami; feet pinkish vinaceous.

The single egg taken at Cocos Island measures 58.7 mm. × 40.8 mm. It is dull chalky white in color.

MEASUREMENTS OF ADULTS (in millimeters)

Number	Sex	Locality	Phase	Wing	Tail	Culmen	Tarsus	Middle Toe
2408	♂	Revilla Gigedo	Light	413	224	86.7	35	63
2411	♂	Revilla Gigedo	Light	406	219	85.1	34.2	59
2429	♂	Cocos	Dark	404	232	88.8	33.1	61
2430	♂	Cocos	Dark	395	205	87.1	33.1	61
2433	♂	Cocos	Dark	390	216	82.9	32	58
2434	♂	Cocos	Dark	388	230	87.7	31.1	61
2448	♂	Cocos	Dark	398	218	90	33.4	60.6
2414	♂	Galapagos	Pied	381	192	87.9	31.4	57
2415	♂	Galapagos	Pied	414	230	91.7	33	62.6
2416	♂	Galapagos	Pied	404	207	91	37.1	61
2432	♂	Galapagos	Dark	422	217	88	36	64
2437	♂	Galapagos	Dark	395	214	87.8	35.1	63.5
2441	♂	Galapagos	Dark	395	217	88.3	34.1	61.8
2445	♂	Galapagos	Dark	399	191	89	33.3	60.5
2449	♂	Galapagos	Dark	390	214	84.4	32	58
2409	♀	Revilla Gigedo	Light	411	213	90.2	35	65.6
2410	♀	Revilla Gigedo	Light	385	216	90	32.7	61
2422	♀	Cocos	Dark	411	212	91.3	37	65.1
2425	♀	Cocos	Dark	395	215	82.5	32.3	60.7
2428	♀	Cocos	Dark	412	214	87.4	35	63.1
2431	♀	Cocos	Dark	418	223	94.2	35	61
2438	♀	Cocos	Dark	391	214	87.3	34	61.4
2420	♀	Galapagos	Pied	390	195	88.7	35	59.6
2421	♀	Galapagos	Dark	419	212	92	33	60
2423	♀	Galapagos	Pied	399	212	84	33.7	60.8
2426	♀	Galapagos	Dark	402	212	84.5	32	57.8
2427	♀	Galapagos	Pied	412	198	90.5	38.9	63.1
2435	♀	Galapagos	Dark	410	215	92.7	33	60
2436	♀	Galapagos	Dark	397	205	93.1	34.4	61.9
2439	♀	Galapagos	Dark	408	211	86	31.9	60.9
2443	♀	Galapagos	Dark	385	199	86.5	32.7	62

Sula variegata: Peruvian Booby

Abingdon, Albemarle, Barrington, Bindloe, Brattle, Champion, Charles, Chatham, Cowley, Crossman, Culpepper, Daphne, Duncan, Enderby, Gardner-near-Charles, Gardner-near-Hood, Hood, Indefatigable, islet off northeast James. James, Nameless, Narborough, Seymour, Tower, and Wenman islands.

This booby was found pretty commonly throughout the archipelago, and chiefly about the islands on which it bred. It frequented the open sea rather than the sheltered bays, differing in this respect from the Blue-footed Booby. The farthest south we saw it was latitude 3° 39′ South, longitude 93° 1′ West. Off the coast of Colombia and Ecuador, we

saw on two occasions a large white booby, which we took to be this species. The day after leaving Culpepper Island, September 26, 1906, we saw one in latitude 3° 29′ North, longitude 93° 6′ West; while on October 13, 1906, a nearly adult bird was taken in latitude 15° 36′ North, longitude 110° 12′ West. Mr. Beck records two at Clipperton Island, Mexico, and two at Cocos Island, Costa Rica.[1]

The breeding-places and breeding-dates for this species in the Galapagos Islands, so far as known are as follows: Culpepper in July and December; Daphne in November; Enderby in May; Gardner-near-Charles in October; Hood in February, May, and October; Wenman in February and December.

The nest was a mere depression in the soil, usually surrounded with pebbles and bits of rock, and invariably situated close to the sea, often on the edge of some precipice or on a ledge of a cliff. A sitting bird was frequently seen picking up bits of rock with its bill and placing them around the nest. When both male and female were at a nest they had the habit of touching bills.

Whenever a bird was driven from a nest, it left with great reluctance, and usually returned in a minute or two with much squawking, and fondly covered its charge. When the mate arrived to relieve the nest bird, there was also a great deal of squawking. One day I was sitting in front of a nest when the second owner arrived. The nest bird immediately drew its attention to me, and apparently tried to induce it to join in an attack on me.

The first place in which we encountered Peruvian Boobies breeding, was the larger Daphne Island, where they were nesting on the steep seaward slopes and on the rim of the crater, but not within the crater itself, which was occupied by Blue-footed Boobies. On November 23 some had eggs, and others had young.

They were nesting abundantly on Hood Island in early February. On February 1st some birds were seen with fresh eggs, some with one egg and one young, others with two very young ones, and others still with one young one only. All of the young were either naked or in the down. The adults seem, however, to rear only one young one, for I have never seen

[1]Condor, v. 9, p. 110.

more than one in a nest when they approach the feathered stage. The great difference in size between the two nestlings in the same nest is particularly noticeable as their age increases; one is small and puny, the other robust and strong. When we visited Hood Island again in latter June, there were a number of young about, which still had some down on them.

A young bird in down was taken on Enderby on May 14. Its bill and feet were olive-gray.

On one occasion Mr. Beck saw an adult Peruvian Booby taking care of a downy Man-o'-war Bird in a nest of the latter species.

Unless continually persecuted, these boobies exhibit practically no fear of man. The young particularly show considerable curiosity. Just south of Hood Island, on June 23, we encountered large numbers of them, many of which kept alighting within two or three feet of the schooner. Fifty or sixty were seen on the water intermingled with as many Dusky Shearwaters.

On Hood Island, Peruvian Boobies were to be seen sprinkled about among the Man-o'-war Birds, Blue-footed Boobies, and Galapagos Albatrosses, which had nesting-sites close to the cliffs. When asleep at the nest, these boobies thrust the bill down the middle of the back under the feathers.

Apparently the boobies are bothered somewhat by the Galapagos Hawks, for I noticed an adult booby, with a young one in the nest, show considerable alarm when a hawk alighted on a rock close by. In defence against human intruders, the boobies use their bills with telling effect.

During March, when on the south coast of Albemarle Island, Peruvian Boobies were noted each evening flying toward Brattle Island. The flight was not particularly swift or graceful. Several slow wing-beats were succeeded by a long sail. Single birds usually flew somewhat higher than the flocks. When three or four were together they kept time in all their movements, usually following a leader, sometimes one behind another, sometimes bunched. One was observed following a Blue-footed Booby in a similar manner. At sea they not infrequently circled about the vessel. On land they waddle, usually with the tail scraping the ground.

I have never seen the adults dive, but I once saw an immature bird do so. It shot obliquely into the water from a distance of only a few feet, entering at a very small angle and making a semicircle while in the water. It came up facing in the direction just opposite to that in which it entered. One day I saw one sitting on the water with head immersed for a long time, and apparently looking for food. Fish seem to constitute their chief diet. Once I saw a Peruvian Booby attack a wounded Blue-footed Booby and force it to disgorge. On another occasion I saw one catch a flying-fish by skimming close over the water after it.

The colors of the naked parts of the adults in life were as follows: Bill vinaceous-pink, shading into ochre-yellow at tip and along tomia; gular sac slate-gray; iris gamboge-yellow; feet dark olive-buff.

An immature bird shot at Cormorant Bay, Charles Island, on May 17, had an olive-buff bill; the gular sac and feet were of about the same color as those of adults. Gular sacs of young in down were flesh-colored. In fully fledged young they were dark blue or blackish blue.

Although the Academy's series of skins of this species numbers sixty-nine, and is well supplied with birds both in juvenal plumage and in adult plumage, specimens are lacking to show the complete transition from juvenal to adult. One specimen, No. 2478, taken on October 12, 1906, in latitude 15° 40′ North, longitude 110° 12′ West, is apparently just completing the assumption of the adult plumage, for a number of partially dusky feathers are still to be seen in the upper parts.

An examination of the adult males in the collection revealed birds with new outer primaries appearing, as follows: From Hood Island in June and October; from Culpepper in September. Only one female (No. 2510) was found in a like condition—an individual taken on Hood on October 2. In most cases the males seemed to be somewhat in advance of the females in the progress of the moult.

In conjunction with the measurements of twenty-three adult males and twenty-five adult females, there are given for the sake of comparison, in Table XI, p. 117, the measurements of seven adult males and six adult females of *Sula cyanops*. The average *Sula variegata* has a decidedly longer wing, and has

a relatively shorter tarsus in comparison with the middle toe, than has the average *Sula cyanops*. Males seem to average decidedly smaller than females in most respects.

Fifteen eggs of the Peruvian Booby, taken by Mr. Beck on Hood Island on February 4, yield the following maximum, minimum, and average measurements in millimeters: Length 55–68.4 (63.5); breadth 38.6–49.5 (44.8). These fifteen eggs comprise eleven sets, four of two eggs each and seven of one each. The sets of two eggs each measure as follows: 61.6×44.5, 62.5×46; 65.5×45.6, 55×38.6; 62.8×46, 65×46.6; 62.6×45.8, 61.7×44.7. On several of the data-sheets Mr. Beck states that the nest had been occupied four months before by Neboux's Booby (*Sula nebouxi*).

In addition to eggs of *Sula variegata* from Hood Island, Mr. Oates has referred a number of eggs of *Sula cyanops* from San Benedicto and Clarion, Revilla Gigedo Islands, to this species.[1]

Sula nebouxi: Blue-footed Booby

Plate V, Fig. 2

Abingdon, Albemarle, Barrington, Bindloe, Brattle, Champion, Charles, Chatham, Cowley, Crossman, Daphne, Duncan, Enderby, Gardner-near-Charles, Gardner-near-Hood, Hood, Indefatigable, islet off northeast James, James, Jervis, Kicker, Narborough, Onslow, Seymour, Tower, and Wenman islands.

The Blue-footed Booby was by far the commonest and most generally distributed of the three species occurring in Galapagos waters. Like the Dusky Shearwater, the Graceful Petrel, and the Sooty Gull, it seemed to prefer to be in close proximity to the land, rather than to haunt the open ocean as do the Red-footed and the Peruvian Boobies. Except for a single specimen taken at the San Benito Islands, Baja California, on July 15, 1905, we saw no Blue-footed Boobies outside of the archipelago.

When not fishing, the Blue-footed Boobies frequently congregated on the low black lava-points which jut into the sea, the assemblages varying from two or three to thirty or forty, Single birds and pairs are often seen standing on the ledges

[1]Cat. Coll. Birds' Eggs Brit. Mus., v. 2, p. 211.

and on the tops of sea-cliffs. On south James they were seen in the mangroves. It was not unusual to find them asleep in broad daylight. An entire flock, however, was never caught napping, two or three birds always being awake and on the lookout.

When offshore and on a journey, the Blue-footed Boobies frequently flew in single file, all following the undulations of the leader. On the south coast of Albemarle Island, in May, they were noted flying towards Brattle Island each evening. Single birds met with offshore usually circled about the schooner. The birds noted about the bays and coves had the habit of continually looking downward when flying, apparently in search of fish.

The fish were almost invariably caught by diving, although an occasional flying-fish was chased and caught while in the air. It was a common thing to see Blue-footed Boobies fishing in flocks, often all diving simultaneously. They dive with wings half-closed and neck rigid and straight, striking the water with great force. As all would not get fish when diving in a flock, there was usually considerable squabbling over captures. One day a booby was seen to enter the water obliquely at a very small angle, appearing quickly on the surface again and continuing its line of flight without a pause.

At Finger Point, Chatham Island, in the middle of February, there were several Blue-footed Boobies standing about in the vicinity of some old nests three or four hundred feet above the ocean. Whenever a bird alighted, there was a great deal of squawking and bowing and waddling carried on by it and its mate. In latter March during the mating-season at Tagus Cove, Albemarle Island, they were quite demonstrative, the mated birds seeming to talk to each other, and managing to keep up an incessant racket. One of them as a rule did considerable strutting about, lifting its feet very high with each step, and appearing to us very ridiculous. They made a very elaborate bow, uttering one or two short notes at the same time. With the breast almost touching the ground, the neck stretched upwards, and the wings outspread but held vertically, the ceremony of bowing would last for about half a minute.[1]

[1]Cf. Beck, Condor, v. 6, pp. 6-8.

The nest of this species was like that of the Peruvian Booby, a mere depression in the earth in which two eggs were laid. On Hood and Champion Islands Blue-footed Boobies nested in the vicinity of the shore, sometimes along the tops of cliffs, at other times close to the water. The birds at Hood Island in September, 1905, were nesting beside white glazed rocks and in the broiling sun, with no shelter whatsoever. Many of them were sitting on their nests with mouth open, panting with heat and thirst. On Daphne they nested on the sandy floor of the crater, which is three or four hundred feet deep and very hot, as it is protected on all sides from the wind. Only one pair was seen nesting outside the crater. At Tagus Cove they nested on the broad ledges and tops of the low tufaceous cliffs.

The following notes on the time and place of breeding of the Blue-footed Booby, taken in conjunction with the observations of other expeditions, point to an almost continuous breeding-season. We found eggs, young in the down, and fully fledged young at Hood Island, in September and October; both naked young and young assuming juvenal plumage at Hood in February; eggs, birds in down, and well-feathered young at Champion in October; young in the down at Champion in February; naked young at Brattle in October; eggs and downy young at Daphne in November; large young of various ages at Daphne in July; fresh eggs at Tagus Cove in March; and one large young one at Tower in September. There are two young hatched; but by the time they reach the partially-feathered state, seldom more than one has survived.

The half-fledged young exhibited considerable pugnacity. When one was shoved into a neighbor's domain, a fight ensued, the birds seizing each other by the beak and then having a tug-of-war for perhaps a minute.

An adult taken at Academy Bay, Indefatigable, had its right foot deformed. At the junction of the toes with the tarsus the foot was enlarged and immovable, the toes were bent under and altogether rigid, and one claw was much elongated.

Breeding adults taken at Tagus Cove had the following life-colors: Feet pale blue; bill plumbeous; gular sac china-blue.

The juvenal plumage of *Sula nebouxi* at first glance resembles somewhat that of *Sula variegata,* but is readily distinguished from it by the narrow feathers of the neck, as well as by the pale brown of the upper breast. The specimen mentioned by Messrs. Rothschild and Hartert in their first Galapagos paper as "probably not in the first plumage, but in a transitional one,"[1] is evidently a bird in juvenal ("first") plumage. In the Academy's series there are a number of specimens passing from the down into this plumage.

In their second paper these gentlemen seem to have been more seriously misled, for the description they give for the "first" (juvenal) plumage of *Sula nebouxi* fits the young of *Sula variegata* and not the young of *Sula nebouxi.* "These birds in the first plumage differ from the adult ones in having the feathers of the head and neck (which in adult birds are narrow and pointed, giving these parts a streaked white-and-brown appearance) shorter, soft, wide and rounded, and of a uniform deep smoke-brown colour, so that the neck is in a striking contrast to the white breast and abdomen."[2] Every point here given fits *Sula variegata* rather than *Sula nebouxi.* The young of *Sula nebouxi* have the upper breast pale brown and "the whole neck smoky brown, with paler tips to the feathers,"[3] which are long and narrow. There is not the striking contrast between the neck and the upper breast as in *Sula variegata.*

Again, in their second paper, Messrs. Rothschild and Hartert state that in the "first" plumage of *Sula nebouxi* "the white interscapular saddle, which is so conspicuous in adult *S. nebouxi,* is not developed." In every one of a series of thirteen Academy specimens—some partly in the down, others in full juvenal plumage—the white interscapular saddle is more or less conspicuous, being even more noticeable than in adults on account of the sharper contrast of colors. The young of *Sula variegata* lack this saddle.

In the Academy's series of adults, three have the outer primaries in a pulpy state basally: No. 2543, a male taken at Duncan Island on December 9; No. 2570, a female taken at Duncan on December 14; No. 2579, a female taken at In-

[1]Nov. Zool., v. 6, pp. 178, 179.
[2]*Ibid.*, v. 9, p. 407.
[3]*Ibid.*, v. 6, pp. 178, 179.

defatigable on July 18. Inasmuch as the breeding-season extends practically throughout the year, the various plumages do likewise.

The measurements given below of twenty adult males and twenty-seven adult females reveal the fact that on the average the female is somewhat superior to the male in size. The measurements of length of tail are not very dependable, for the central tail-feathers in this species are very long and hence suffer much from wear. The maximum, minimum, and average dimensions in millimeters are: Males—Wing 412–460 (433); tail 200–239 (222); culmen 101–118 (108); tarsus 47–55 (50); middle toe 64.9–78 (70). Females—Wing 428–465 (447); tail 207–250 (227); culmen 110.6–121 (115.4); tarsus 51–57 (53.7); middle toe 69.4–81 (74.2).

The eggs of *Sula nebouxi,* like those of other boobies, have a very pale bluish ground-color over which there is a chalky-white coating. One specimen lacks this coating, and is a pale blue all over. The other egg in the same clutch has the coating.

Seventeen eggs (ten of them composing five sets of two each, the remaining seven composing seven sets) collected by Mr. Beck from a colony on southeast Hood on September 28, 1905, yield the following minimum, maximum, and average dimensions in millimeters: Length 57.6–67.7 (62.3); breadth 40.2–45.4 (43.1). The eggs comprising the sets of two each measured by sets: 64.5×41.1, 63×42.9; 61.4×43.6, 63.5×44.5; 63.5×43.5, 61.6×42.6; 57.6×42, 59×40.2; 61.9×43.6, 61×43.9.

Sula brewsteri: Brewster's Booby

It is not unlikely that the birds reported from the Galapagos Archipelago as Brewster's Boobies were either the young of the Peruvian Booby or the young of the Blue-footed Booby.

The three centers of abundance of Brewster's Booby visited by the Galapagos Expedition were San Benedicto, Revilla Gigedo Islands, on July 26; Clipperton Island, Mexico, on August 10; and Cocos Island, Costa Rica, September 3-13, 1905.

We first encountered Brewster's Boobies on July 24, latitude 19° 40′ North, longitude 112° West. They were com-

mon, especially toward evening, when they passed in flocks of ten or more. One came aboard the schooner after dark and was captured. At San Benedicto they were fairly common. Two nests were found; on one a male was brooding a young bird; on the other a female was brooding two eggs.

A number of Brewster's Boobies were observed daily on the voyage from San Benedicto to Clipperton Island. There appeared to be no decrease in numbers to indicate where the birds from one colony ended and those from the other began. In the vicinity of Clipperton Island they were observed in mixed flocks of birds, consisting of such species as the Dark-rumped Petrel, Wedge-tailed Shearwater *(Puffinus chlororhynchus),* Noddy, Clipperton Noddy, Blue-faced Booby, and Sooty Tern. On a squally day I noted an adult male dead on the water, evidently struck down by a wave.

At Clipperton Island Brewster's Boobies were nesting abundantly all around the island, here and there interspersed with colonies of Blue-faced Boobies, which, however, were not nesting. Of the Brewster's Boobies, some had eggs and others naked young. The nests were mere depressions lined with wing-quills.

The first birds of the Cocos Island colony were seen on September 1st, when some thirty or forty miles south of that island. On the 2nd they were fairly common; in the morning they were noted flying away from the island, and in the evening towards it. In this region their headquarters were on a small island offshore, situated between the small outlying islands of Nuez and Cascara. Only two or three individuals were observed on the main island. On September 13 we found them nesting abundantly, little hollows in the soil amongst the rocks and grass on the steep slopes of the island being utilized for nesting-sites. Naked and downy young and eggs, sometimes one, sometimes two, were found.

On the voyage home from the Galapagos Islands in 1906, from one to three birds were seen on October 4, 5, 7, 8, 10, and 13. On October 4 the "Academy" was in latitude 14° 24′ North, longitude 107° 5′ West; on October 13 in latitude 15° 36′ North, longitude 110° 12′ West. One bird taken had a number of ticks attached to its gular sac.

Adult Clipperton birds had the following colors of the naked parts in life: Males—Bill glaucous blue; gular sac indigo-blue; feet pea-green; iris silvery gray, distinct on the outer edge, but nearly obscured by black on the inner edge. Females—Bill olive-buff; gular sac indigo-blue, washed with pea-green; feet pea-green.

Although the Academy's series of Revilla Gigedo birds is very small, what few there are seem to be intermediate in color between the Cocos and the Clipperton birds, leaning distinctly toward the latter.

None of the Academy's series are moulting the primaries. Clipperton birds, however, have their primaries and tails extremely abraded in many cases; in fact, among the females it was impossible to obtain measurements of the length of tail, as it was broken off in every case. Clipperton birds probably renew their plumage by a postnuptial moult about September and October.

In the vicinity of San Benedicto and of Clipperton, we captured a number of birds which were passing from a brown immature plumage into the adult plumage. Two small white downy young from Cocos show the tip of the upper mandible to be more abruptly decurved in birds of that age than in adults.

The measurements in Table XII, p. 117, show that Clipperton birds average slightly larger than Cocos birds.

A series of twenty-four eggs from Cocos Island are all stained a dirty brown, evidently on account of the dampness of the nests, which is incidental to the rains which deluge the island daily. Sixteen of these eggs compose sets of two each, while the remaining eight compose sets of one each. The extreme and average measurements, in millimeters, for the whole series are as follows: Length 50.3–63.1 (58.7); breadth 37.5–42.5 (39.8).

The measurements of the eight sets of two eggs each show that there is some variation in size in the eggs of each set. By sets these eggs measure as follows: 53.6×40, 54.5×40; 63×41.6, 58.9×39.5; 58.3×40, 55.5×38.2; 62.5×39, 59.7×37.5; 62×39.9, 60×39.6; 60×40.2, 58.5×39.5; 63.1×42.5, 60.1×42; 62.2×40.7, 62.5×39. From the above it is plainly seen that there is considerable variation in the ratio of length

to breadth, or in other words, that the eggs vary considerably in shape. The extreme forms are ovate and elliptical-ovate.

Fregata aquila: MAN-O'-WAR BIRD

Plates VI and VII

Abingdon, Albemarle, Barrington, Bindloe, Brattle, Champion, Charles, Chatham, Culpepper, Daphne, Duncan, Enderby, Gardner-near-Charles, Gardner-near-Hood, Hood, Indefatigable, James, Jervis, Kicker, Narborough, Onslow, Seymour, Tower, and Wenman islands.

The Man-o'-war Bird is present at all times about the coasts and waters of the Galapagos Islands, often being seen flying over the land as well as the sea, usually at a considerable height. At the fresh-water crater-lake, "El Junco," on Chatham Island, at an elevation of about twenty-six hundred feet, several were observed bathing, or perhaps drinking,[1] by swooping down and letting their feathers touch as they passed over the surface of the water. They frequently came about the vessel in company with the Graceful Petrel, particularly when turtle or tortoise fat was thrown overboard. One taken off southern Albemarle on April 27 had a very small turtle in its stomach.

I have never seen this species resting voluntarily on the water; in fact, the feathers become wet in a very short time if immersed. It was seldom observed on shore except at the nesting-places, where it was abundant. Outside of these resorts, an occasional bird was seen sitting on the top of some mangrove or on a jutting rock of a sea-cliff.

The Academy's Expedition found Man-o'-war Birds nesting on the following seven islands: Brattle in October; Culpepper in September; Enderby in May; Gardner-near-Hood in September; Hood in February, June, and September; Tower in September; Wenman in September.

In the latter part of September, 1905, there was quite a large colony nesting near the southeast extremity of Hood Island. The majority of the nests contained well-feathered young, although three fresh eggs were taken on September

[1]Cf. Fisher, Bull. U. S. Fish Comm., 1903, p. 31; Bonhote, Ibis, 1903, p. 312; Lowe, Ibis, 1909, p. 334.

27. The nests rested on the tops of small shrubs (*Sesuvium*) and were made of the dried stems of those plants. At the same time on the neighboring Gardner Island there was a small colony nesting in some bushes on the side of a cliff on the north side of the island. The nests were built of twigs and contained downy young.

On Brattle Island, October 30, they were likewise found nesting in low bushes. The nests were built of twigs and contained only well-feathered young.

In early February the Man-o'-war Birds were just beginning to nest again on southeast Hood. As in the preceding September, the nests were placed on the tops of small shrubs about six inches above the ground. Many nests were almost touching each other, so close together were they built. At this time nesting had evidently only begun, for we saw a male carrying nesting material, and all the eggs observed were fresh. Males as well as females were sitting on the nests, many of the former having their bright red pouches distended. The majority of the males were in the iridescent black plumage. When sitting on the nest, the male often gives a call, which resembles a chuckling laugh. I have never heard this call except in the mating season. Both males and females on the nest were silent when approached, but often defended their homes quite vigorously, using their bills with telling effect. During our February visit a pair were observed in the act of coition on the nest, the male balancing himself quite adroitly.

A very small young one in the down was taken on Enderby Island on May 14.

On our third visit to Hood Island in the latter part of June, a great many young which had just left the nest were observed, all having pale brownish heads and necks and white under parts. These were undoubtedly hatched from the eggs laid in February. A good-sized flock of young birds remained constantly over us, without beating their wings, as we sailed along the coast, keeping the decks of the schooner spattered with their droppings. On the southeast part of the island we found a good many nests which contained young still in the down. One youngster was being cared for by a Peruvian Booby. Of the Man-o'-war Birds, males as

well as females were guarding the young. When approached they usually remained quiet, only making a few passes at one with their beaks. The youngsters, however, were quite noisy and anxious to bite. An examination of the stomachs of several young disclosed the remains of flying-fish. One adult male was observed with a bright red distended pouch, which seemed to be unusual at that time, as all the others had dull-colored ones. This same male also uttered the chuckling call so commonly heard during the mating season. Other males gave an occasional harsh scream. The air above the nesting-site was constantly alive with birds flying hither and thither.

In the middle of September, 1906, Man-o'-war Birds were found nesting all along the north coast of Tower Island, and as far inland as the top of the island and the rim of the crater. The nests were small, built of sticks, and placed in low *Bursera* trees at an average of about seven feet from the ground. Young in the down in all stages were found. When approached, the youngsters would open their bills and squeak in a threatening manner.

On Wenman Island, on September 24, 1906, a few young in down were noted on the ground and on small shrubs growing on the ledges of a steep hillside on the northwest side of the island. On the plateau on the same side, several pairs were found nesting in bushes about three feet above the ground. One pair had a fresh egg, another a newly-hatched youngster.

On a visit to Culpepper Island on September 25, 1906, a number of young in the down were seen.

A very young bird in the down, taken on Enderby Island, had china-blue feet and bill, the latter tipped with white. The entire skin over the body was also china-blue.

The colors of the naked parts of birds taken on Hood in the latter part of June, when the adults were in worn plumage and the organs of reproduction small, were as follows: Orbital ring black in adult males, red in adult females, and pale blue in immature birds. Bills were pale blue in all but adult males.

Three birds with large sexual organs were taken at Academy Bay, Indefatigable Island, on July 16. Two were adult females with orbital rings dark blue, gular sacs purplish,

and feet red. The remaining bird, an adult male, had a bright red gular sac.

The farthest south we saw the Man-o'-war Bird was latitude 3° 41′ South on June 12, 1906. East of the archipelago we met with it occasionally on the ocean, but it was nowhere seen in any numbers except at Manta Bay, Ecuador.

On the voyage out from San Francisco we saw the first Man-o'-war Bird at the Tropic of Cancer on July 22. At San Benedicto, Revilla Gigedo Islands, they were nesting abundantly on July 26, the nests being situated on the low land as well as on a high mesa. The nests were built on the top of clumps of grass, and in most cases contained a single white fresh egg. Six nests out of about two hundred contained two eggs each.

On July 27 and 28 we saw a number of Man-o'-war Birds about the coast of the neighboring Socorro Island. On the voyage from Socorro to Clipperton Island, Mexico, they were seen occasionally. At Clipperton, August 10, we saw none on the island, but there were two or three hundred sailing over it during the forenoon. About noon they all headed out to sea in an easterly direction.

Between Clipperton and Cocos Island, Costa Rica, a few were seen. At Cocos, during the first half of September, they were very common over the water and in the high trees in the forest. Many males in fine glistening black plumage were observed flying about with their bright red pouches distended; so, evidently, September was the opening of the breeding-season, and undoubtedly the nests were placed in the tops of the tall trees, where so many of the birds could be seen and heard. At Cocos they persecuted the small Clipperton Noddies as well as the boobies.

On the voyage home from Culpepper Island, we saw several on September 26th in latitude 3° 29′ North, longitude 93° 6′ West; on the 27th in latitude 5° 34′ North, longitude 95° 27′ West. Then came a hiatus until October 7th, when one was seen in latitude 14° 38′ North, longitude 109° 12′ West. After that they were seen every day or so until October 24th, latitude 19° North, longitude 116° 41′ West. They frequently made unsuccessful attempts to alight on the topmast of the schooner.

With one exception all the specimens of *Fregata aquila* in the Academy's collection are from the Galapagos Islands. Birds in juvenal plumage, and assuming juvenal plumage, have the entire head and neck a rich cinnamon-rufous. No exception to this is found in the Academy's series.

Five adult males and six adult females from the Galapagos Islands measure in millimeters as follows: Males—Wing 595–660 (633); tail 400–490 (463); culmen 90–114 (104); tarsus 18.6–23 (21.2); middle toe 46–51.4 (49.1). Females—Wing 680–710 (696); tail 480–515 (503); culmen 122–127 (125); tarsus 21–23.7 (22.7); middle toe 51–57 (54.8).

A series of sixty-seven eggs from San Benedicto and a series of thirty-seven from the Galapagos Islands give practically the same average length and breadth. Among the sixty-seven San Benedicto eggs, however, the difference between the extremes is greater, as can be seen from the following measurements in millimeters: San Benedicto—Length 63.1–77 (69.6); breadth 43–50.6 (47.2). Galapagos—Length 64.1–74.6 (69.3); breadth 45.5–49.4 (47.5). A set of two eggs from San Benedicto measured 68.9×47.2, 71.1×46.2.

Phaethon æthereus: Red-billed Tropic-bird

Abingdon, Albemarle, Barrington, Brattle, Champion, Charles, Chatham, Culpepper, Daphne, Hood, Indefatigable, Onslow, Tower, and Wenman islands.

Red-billed Tropic-birds were not seen in any numbers except at Daphne, Hood, and Tower islands. They, were seen, however, through the entire year. Usually they travelled singly or in couples, but not in flocks. When met with away from land, they frequently flew about the vessel two or three times, keeping quite high in the air. The farthest point south of the Galapagos Islands at which we saw these birds was in 2° 36′ south latitude.

During the breeding-season at Daphne Island I saw birds circling about holes on the hillsides without beating their wings. Whenever they came opposite certain holes they would flutter their wings to check their flight, and come to a standstill for an instant, as though about to alight, but they would continue their circle. This was repeated ten or twelve

times before the bird finally entered the hole. On Hood Island they usually went directly to their holes without hesitation.

Only twice in the archipelago were these birds seen on the water; once I saw three off Daphne Island, and on another occasion one off Mt. Pitt, Chatham Island. In the latter case the bird flew as we passed and shook itself just after getting out of the water. As far as we observed, the tropic-birds are practically immune from the attacks of Man-o'-war Birds. On one occasion only did I see Man-o'-war Birds harass a tropic-bird, and then without success.

The food of the Red-billed Tropic-bird, as shown by the stomachs examined, consists of fish and squids. These were very often disgorged by both young and old when they were taken from their burrows. This species dives for its food somewhat like a tern.

Red-billed Tropic-birds could be recognized at almost any time by their cry, which is long and shrill and consists of a lot of short, high, rasping notes given in quick succession. Birds flying about the nesting-places often gave it, and birds disturbed on the nest also gave it. The young when taken from the nest uttered the same cry, and I have even heard a young bird only a day or so old give three or four notes of it when handled.

The nesting-places were usually holes in cliffs and hillsides in the vicinity of the sea. As a rule the single egg was laid at the end of a short burrow or in a cavity under a rock, but sometimes it was laid in an open depression. I have found them nesting two or three hundred feet above the sea, as for instance, on Daphne Island, where they nest from top to bottom of the island. Often two birds would be taken from a burrow; when such was the case no eggs or young were found. One bird which I disturbed on its nest was in a good light so that I could see it. It was sitting on its egg with wings drooping at its sides, feathers raised, and every feature showing rage at my intrusion.

The following are some of the breeding-places: Daphne in April and November; Hood in February, September, and October; Onslow in February. Young birds and eggs were taken on Daphne in the latter part of November; a fresh egg

was taken on Hood, September 28, 1905, and eggs and young in early February, 1906. On Hood I took a bird and a fresh egg from a nest, in which five days before a pair of Swallow-tailed Gulls held sway. Many tropic-birds were occupying nests the owners of which had been killed less than a week before. These facts give some idea of the great demand for nesting sites on southeast Hood. At Onslow Island on February 25, I noticed two birds in holes in a rock about twenty feet above the water, and I also saw a bird enter a hole.

On the voyage south from San Francisco we first met with the Red-billed Tropic-bird to the west of San Martin Island, Baja California, on July 9 and 10. We again saw one on July 22 in latitude 22° 25′ North, longitude 112° 40′ West. At San Benedicto, Revilla Gigedo Islands, they were fairly common, and we saw some in holes in cliffs over the ocean. On the coast of Ecuador, in the vicinity of Manta, on September 18, 19, and 20, we saw several. So all in all, it did not prove a common species at sea on the voyage from San Francisco to the Galapagos Islands.

On the homeward voyage from the Galapagos, we saw single birds on seven occasions, beginning on September 28, 1906, in latitude 7° 23′ North, longitude 97° 48′ West, and ending on November 4, in latitude 26° 50′ North, longitude 126° 47′ West.

In life, the adults have the bill of a crimson color; outer part of toes and webs black; tarsi and inner part of toes and webs ochraceous buff; under sides of toes and webs pearl-gray. The bills of the unfledged young are grayish and yellowish, while the bills of the fully fledged young are a distinct yellow.

An examination of the Academy's series of adults from the Galapagos Islands shows specimens from Daphne in November, which are apparently just completing a postnuptial moult, as testified by new and growing primaries. The same remarks apply to a specimen taken at Hood in February.

From the measurements given below, it appears that the sexes are evenly matched in size. The long tail-feathers, however, are so subject to wear and tear that it is doubtful if any one measurement represents the total length of the longest tail-feather in an absolutely perfect state. Of the

series of thirty-six males measured seventeen had tail-feathers from 600 to 790 millimeters in length (average 658), while of thirty-four females only two had tail-feathers over 600 millimeters in length (one measured 610, the other 667; average 639). The remaining measurements, in millimeters, are as follows: Thirty-six males—Wing 301–332 (314); culmen 60.1–69.7 (64.7); tarsus 24.8–28.2 (26.5); middle toe 33.5–38.1 (36.2). Thirty-four females—Wing 304–335 (314); culmen 59–70 (63.9); tarsus 25-28 (26); middle toe 34.2–39.5 (36.5).

The Academy's series of fifteen eggs shows apparently the full variation in markings and shape ascribed in the books to the eggs of this species. The fifteen eggs, representing as many sets, yield the following extreme and average dimensions: Length 54.5–67.2 (61); breadth 41.1–45.1 (43).

Phaethon rubricaudus: Red-tailed Tropic-bird

The Red-tailed Tropic-bird was positively identified on three occasions. On July 30, 1905, we saw one in latitude 14° 58′ North, longitude 110° West. On August 21, 1905, in latitude 7° 3′ North, longitude 101° 36′ West, one was shot, but we failed to pick it up because of the speed at which the schooner was sailing. On October 22, 1906, in latitude 17° 53′ North, longitude 114° 45′ West, one circled about the vessel several times.

On two occasions we saw birds which were unquestionably of this species far north of the Tropic of Cancer. The first case occurred on November 7, 1906, in latitude 29° 38′ North, longitude 129° 2′ West, when three flew about the vessel. The second case was on November 13, in latitude 32° 38′ North, longitude 133° 32′ West, when one flew about the vessel.

Pelecanus fuscus: Brown Pelican

Abingdon, Albemarle, Barrington, Bindloe, Brattle, Charles, Chatham, Cowley, Daphne, Duncan, Gardner-near-Hood, Hood, Indefatigable, James, Jervis, Narborough, Seymour, and Tower islands.

When travelling along the rocky shores of the larger islands, we frequently met with the Brown Pelican, usually

singly. When not fishing, this bird roosts on the rocks and on the mangroves which are in many places found growing along the sea-coast proper. Once or twice it was seen on the ledges of sea-cliffs. Although quite easy to approach, it was somewhat warier than the boobies. Occasionally one could be surprised while standing asleep with its bill stuck down the middle of its back. When approached closely, this species keeps its wings trembling as if nervous. The habit is perhaps similar to the twitching of the tail in certain herons.

In the Galapagos Islands Brown Pelicans serve as scavengers. On several occasions they were observed to pick up the bodies of large birds, after we had skinned them and thrown them overboard. In one case an immature pelican had got the bodies of two Galapagos Hawks into its pouch, and was unable to swallow them. Likewise it was unable to fly on account of the weight. It was probably grateful when we rowed up to it, where it was sitting on the water, and removed the impedimenta, for it flew away joyfully enough afterwards.

We never saw a pelican make a graceful dive. Invariably they just tumbled into the water from a few feet above it. They often fished along the line of small breakers close to the shore, and after making such a dive, frequently had to get up hurriedly to avoid being overwhelmed by a wave.

No noise was ever heard from this species, except from the young birds in the nests; and they can squawk vociferously—the squawk being long and hoarse.

When nesting, the adult will frequently allow a person to approach within two or three feet of it before leaving the nest, which it makes no attempt to defend. I saw a pair copulating on their nest at Tagus Cove, Albemarle Island, on April 1. They had no eggs in the nest. All of the other nests of the colony of ten or twelve had single birds on them. Some had eggs, others none. The nests were bulky affairs of sticks built in bushes on a steep hillside close to the water. The area occupied was about one hundred yards by twenty-five yards. The birds were somewhat wary, some flying upon the near approach of the boat.

At South Seymour Island, on November 22, three nests were seen in a low tree near the shore. Two had one young-

ster each, and the third two. On northern Indefatigable, November 25, nests with young were observed in the mangroves and also on the ground. On Jervis Island, December 18, a young bird in the down was found in a nest in a low bush at the top of a beach. At Academy Bay, Indefatigable Island, in early November, young were observed in nests built at least twenty feet above the ground in the mangroves. In the middle of the following January the same birds were observed fishing, apparently under the supervision of their parents, whose example they followed in diving into the water.

On March 12, a few miles west of Villamil, Albemarle Island, four occupied nests were found in the low mangroves fringing the rocky shore. They were built in the usual bulky style, and the two which were examined each contained three incubated eggs. At Banks Bay, Albemarle, April 11, three nests were found in some small mangroves about eight feet high. They were shallow, built of sticks, lined with grass, and placed very little above the high-water mark. One had naked youngsters in it; the second contained three eggs; and the third was new.

In the middle of July, at Academy Bay, the same nests which had young in them the previous November, again contained partly-fledged, squawking youngsters, eight months only having elapsed since the previous brood. They were fed by running their bills well into the parent's pouch and gulping in the food.

Brown Pelicans bathe after the manner of most water-birds, by beating the water with their wings. They were occasionally "decoyed" to wounded birds. One day two or three of this species and several Man-o'-war Birds flocked about when a Blue-footed Booby was shot. As a rule the pelicans did not associate with other species. Once or twice, however, they were observed fishing along with Blue-footed Boobies, and at times roosting with them.

It was not unusual to see several Noddies fluttering excitedly about a pelican when it was fishing, and often sitting on its head[1] while it swallowed the fish. Once I saw two on a pelican's head at one time. The pelicans never seemed to be annoyed, nor did the Noddies ever get any fish so far as I

[1]Cf. Audubon, Orn. Biog., v. 3, pp. 379, 380; v. 5, p. 213; Wells, Auk, v. 19, p. 242.

could see. Dusky Shearwaters would occasionally fly about a pelican, apparently to pester it, for one day I observed a pelican take refuge on the top of a cliff from a number of them.

A comparison of the average measurements of a small series of Galapagos and California birds shows the California birds to be slightly the larger. The maximum, minimum, and average measurements in millimeters of the Academy's series of adults from these two localities are given in Table XIII, p. 118.

TABLES OF MEASUREMENTS (in millimeters)

TABLE I—Nesopelia galapagoensis

Islands	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Abingdon	♂	2	123	128	125	67	70	68	16.7	18	17.4	23	24	23.5	23	24	23.5
Barrington	♂	12	127	138	134	67	80	73	17	19	18.1	22.3	25	23.7	22	24.5	23.3
Charles	♂	2	130	132	131	74	74	74	17.1	17.3	17.2	25	25	25	23.4	24	23.7
Chatham	♂	1	130	130	130	63	63	63	17.8	17.8	17.8	24.7	24.7	24.7	23.6	23.6	23.6
Culpepper	♂	3	133	143	139	73	80	77	18	18.5	18.3	24.5	27	26.2	24.5	25	24.8
Duncan	♂	33	124	139	132	66	80	73	16.8	19.5	17.8	23	25.5	24.1	21.8	25	23.2
Gardner-near-Charles	♂	2	121	134	127	68	78	73	16.7	18.3	17.5	22	23.4	22.7	20.4	23.3	21.8
Gardner-near-Hood	♂	6	130	138	133	72	79	75	16.2	18.4	17.1	23.5	25	24.3	23	24.8	23.6
Hood	♂	11	130	139	133	73	80	75	16.7	18.7	17.9	23.3	25.5	24.6	20.7	24.2	23.2
Indefatigable	♂	8	118	138	130	64	79	71	16.4	18.4	17.6	22.3	25.5	24.3	20	24.2	22.6
Jervis	♂	4	129	138	133	75	81	77	18.7	19.3	19	24.3	25	24.7	22	23	22.5
Narborough	♂	1	133	133	133	74	74	74	16	16	16	24.2	24.2	24.2	22	22	22
Wenman	♂	8	131	142	136	68	82	77	17.5	19.2	18.1	25.4	27.3	26.1	23.4	24.8	23.9
Abingdon	♀	5	114	121	118	57	67	60	14.6	16.2	15.5	19.8	21.5	20.9	19.8	22	21.1
Barrington	♀	4	118	123	119	61	70	66	16	17	16.5	21	22.6	21.7	20.5	21.3	20.9
Bindloe	♀	1	124	124	124	65	65	65	16.5	16.5	16.5	22.7	22.7	22.7	21	21	21
Chatham	♀	2	117	123	120	62	71	66	16.3	16.6	16.5	21.5	22.3	21.9	20.2	21.5	20.9
Culpepper	♀	1	131	131	131	68	68	68	17.2	17.2	17.2	22.2	22.2	22.2	21.2	21.2	21.2
Duncan	♀	8	117	123	119	61	67	63	15.3	17	16	20	22.1	21.7	20	22	21.1
Gardner-near-Charles	♀	1	119	119	119	60	60	60	16.1	16.1	16.1	22	22	22	21.1	21.1	21.1
Gardner-near-Hood	♀	1	123	123	123	66	66	66	16	16	16	20.3	20.3	20.3	20.2	20.2	20.2
Hood	♀	16	118	125	121	58	69	64	15.6	17.8	16.6	21	23	22.3	19.7	21.6	20.6
Indefatigable	♀	15	115	125	119	60	71	65	15.5	17.5	16.4	21.6	23	22.3	18.3	20.6	19.7
James	♀	4	118	129	124	63	71	67	15.6	17.1	16.3	22.2	23	22.6	20.7	21.5	21
Jervis	♀	11	118	126	121	62	69	66	15.8	18.2	16.7	21.2	23.2	22.6	19	21.8	19.9
South Seymour	♀	8	120	126	122	65	73	68	15.1	17.3	16.4	21.6	23.5	22.6	19.1	20.6	20
Tower	♀	1	115	115	115	55	55	55	16	16	16	21	21	21	19.2	19.2	19.2
Wenman	♀	3	121	128	125	68	71	69	16	17	16.6	23	24.7	24	19.7	21.3	20.3

TABLE II—**Creciscus spilonotus**

Island	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Abingdon	♂	1	70	70	70	25.5	25.5	25.5	16	16	16	21.1	21.1	21.1	24	24	24
Indefatigable	♂	33	61	72	66	20	25	23	15	17.7	16.3	19.5	22.9	21.5	22	25.4	24.2
James	♂	4	69	70	69.5	24	26	25	16.2	17.3	16.9	21.2	23.4	22.6	25.1	26	25.6
South Seymour	♂	1	68	68	68	25	25	25	15.4	15.4	15.4	21	21	21	23	23	23
Abingdon	♀	2	64	68	66	22	25	23	15	15.1	15	20.5	21.7	21.1	23.7	23.8	23.7
Indefatigable	♀	28	61	72	66	21	26	23	14.7	16.6	15.5	19.7	22.1	21	21.8	25.4	23.6
James	♀	8	66	72	68	24	27	25	15.3	16.5	15.9	21.3	22.6	21.8	24	25.2	24.7

TABLE III—**Spheniscus mendiculus**

No.	Age	Sex	Date	Plumage	Flipper[1]	Tail	Culmen	Tarsus[2]	Middle Toe and Claw
338	Adult	♂	Mar. 21	Somewhat worn	149	27	57.4	26	56.8
340	Adult	♂	Dec. 8	Fresh	166	39	61.1	29	62
349	Adult	♂	Dec. 6	Worn	157	24	60.5	31.6	59.5
339	Adult	♂	Aug. 8	Worn	155	23	61	30.5	62.5
341	Adult	♂	July 26	Worn	152	24	61	27.7	60
353	Immature	♂	Mar. 21	Somewhat worn	143	24	56.6	25.5	58.5
342	Immature	♂	Dec. 8	Fresh	150	32	58	28	61.9
348	Adult	♀	Mar. 29	Somewhat worn	147	27	56	26.1	60
343	Adult	♀	Apr. 6	Somewhat worn	140	25	56.2	26.2	56.3
350	Adult	♀	Mar. 21	Slightly worn	148	27	57.4	26	60.5
351	Adult	♀	Mar. 21	Somewhat worn	154	30	57.1	29	59
352	Adult	♀	Mar. 21	Somewhat worn	144	28	57	28.6	58.5
344	Adult	♀	Mar. 24	Fresh	150	26	56	27.3	59
345	Adult	♀	Dec. 8	Fresh	154	27	57	25.7	60.7
347	Adult	♀	Dec. 8	Worn	155	19	56.8	28.5	58.5
346	Immature	♀	Dec. 28	Fresh	153	33	54.7	25	61.5
354	Immature		Apr. 11	Worn	151	23	58	26	61

[1] Flipper, from insertion.
[2] Tarsus, from lower edge of tibial feathers, in front.

TABLE IV—Anous stolidus

Locality	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Revilla Gigedo	♂♀	2	280	282	281	158	170	164	41.3	43	42.2	24.3	25.5	24.9	30.5	32.4	31.4
Clipperton	♂♀	3	263	285	277	160	165	162	39.4	41	40.2	24	25.5	24.5	30	33	31.6
Cocos	♂♀	8	282	291	285	161	173	165	38.8	42	40	22.4	25	24.1	29.3	32.2	31
Galapagos	♂♀	33	250	281	272	136	163	152	37.5	43.6	40.8	21.6	24.3	23.1	27.6	31.8	29.8
Revilla Gigedo	♀	2	275	275	275	157	160	158	38.4	41.1	39.7	24	24.1	24.1	29.7	30.5	30.1
Clipperton	♀	9	265	278	273	150	163	156	38	41	39.4	23.5	25	24.1	29.5	31.7	30.6
Cocos	♀	3	270	279	274	151	167	157	37.5	39.9	38.8	22	23.6	22.9	28.5	30.5	29.7
Galapagos	♀	39	249	280	267	131	162	149	35.5	42.8	39.2	21	24	22.3	27.3	30.7	28.9

TABLE V—Micranous diamesus

Island	Sex	Number of Specimens	Wing			Tail			Culmen			Depth of Bill at Base			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Clipperton	♂♀	16	216	241	230	112	132	123	40	48.4	44.1	8.2	10.6	9.4	19.2	21.6	20.3	26.5	28.5	27.5
Cocos	♂♀	10	228	240	233	119	130	124	43.5	47.2	45.3	8	9.9	8.6	19.5	21.4	20	26.5	28.9	28
Clipperton	♀	12	215	233	227	112	127	121	39.6	43	41.9	7.3	10.2	8.7	18.1	20.5	19.7	25	29	27.3
Cocos	♀	18	212	246	231	111	129	120	37.1	45.1	42.4	7	8.5	8	18.6	20.5	19.6	25.9	29.5	27.6

TABLE VI—Hæmatopus galapagensis

Locality	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Galapagos	♂♀	19	248	265	257	93	107	100	73.8	91.5	81.4	47.2	52.5	49.3	38.2	43.5	40.3
Baja California[1]	♂♀	9	248	266	258	97	105	102	70	81.3	76.4	45.9	52	48.9	35	39.6	37.3
Galapagos	♀	17	252	268	259	92	103	98	79.6	93	87.4	46.3	51.9	49.4	38.7	43.1	41
Baja California[2]	♀	13	252	272	264	98	107	103	76	91	80.3	47.4	52.5	50.4	36.4	39.7	37.9

[1] The measurements of a male from the Coronados Islands, No. 5242 of Mr. Joseph Grinnell's collection, are included.
[2] The measurements of two females, Nos. 4488 and 4489 Museum of Vertebrate Zoology, University of California, are included. One is from Santa Barbara Island, California, and the other is from San Diego, California.

TABLE VII—Ardea herodias

Locality	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Galapagos	♂♀	5	475	482	478	173	186	179	153	158	155	158	165	162	100	109	105
California	♂♀	11	480	512	492	174	193	184	135	154	148	162	192	176	101	113	106
Galapagos	♀	1	454	454	454	172	172	172	141	141	141	142	142	142	99	99	99
California	♀	19	455	493	477	172	193	179	125	144	136	150	180	165	90	104	98

TABLE VIII—Herodias egretta

Locality	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Galapagos	♂	3	401	405	403	151	157	154	111	117	114	153	164	158	97	107	101
Merced Co., California	♂♂	9	393	416	409	143	177	159	116	125	120	157	176	166	97	110	104
Galapagos	♀	2	357	373	365	140	147	143	106	108	107	142	148	145	97	99	98
Merced Co., California	♀	11	363	401	383	140	153	146	99	123	111	137	155	146	92	99	95

TABLE IX—Nyctanassa violacea

Locality	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Cocos	♂	2	293	300	296	106	111	108	77.8	81	79.4	92.8	94.9	93.8	64.4	64.8	64.6
Socorro	♂♂	1	279	279	279	110	110	110	62.9	62.9	62.9	79.8	79.8	79.8	60.4	60.4	60.4
Galapagos	♂♂	15	264	290	278	98	112	106	67.8	73.8	70.7	83	92	88	57	63	59.8
Galapagos	♀	2	270	282	276	104	108	106	69	70.4	69.7	85	86	85.5	55	56	55.5
Georgia	♀	1	288	288	288	100	100	100	71.2	71.2	71.2	95.9	95.9	95.9	60.2	60.2	60.2

TABLE X—Butorides sundevalli

Island	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Abingdon	♂	2	181	194	187	64	66	65	65	70	67.5	47	50.9	48.9	44.7	47	45.8
Albemarle	♂♂	4	186	190	188	62	67	63	65.5	69.5	67.3	48.5	51.1	49.8	43	48	45.1
Barrington	♂	1	188	188	188	61	61	61	70	70	70	48.7	48.7	48.7	47.6	47.6	47.6
Chatham	♂♂	4	178	193	185	60	68	64	67.2	68.9	68.2	48	50.2	49.3	42.9	47	45.3
Daphne	♂	1	178	178	178	60	60	60	63	63	63	48.6	48.6	48.6	45	45	45
Duncan	♂♂	2	179	182	180	62	62	62	67.8	68	67.9	46.8	47.6	47.2	44.2	44.9	44.5
Gardner-near-Hood	♂♂	4	183	190	186	60	66	64	67.8	71	69.3	49	49.4	49.2	44.3	46.4	45
Hood	♂♂	3	185	195	188	60	64	62	67.2	70	68.5	47	51.4	48.9	44.2	45.7	45
Indefatigable	♂♂	20	176	198	187	57	71	63	62	70.5	66.3	44.3	52.3	48.2	43	49	45.5
Islet off N. E. James	♂	1	189	189	189	64	64	64	65.5	65.5	65.5	50	50	50	48.9	48.9	48.9
James	♂♂	2	187	188	187	63	65	64	65.2	67.2	66.2	47.5	47.6	47.5	45.9	46.1	46
Seymour	♂	1	185	185	185	62	62	62	68	68	68	46.9	46.9	46.9	43.7	43.7	43.7
Abingdon	♀	3	179	186	183	59	67	63	63.9	67.3	65.7	46	49.9	47.8	43	45.4	44.5
Albemarle	♀	3	169	183	175	58	62	60	58.1	67.4	62.7	43.5	48.1	45.9	39.3	44	42.2
Bindloe	♀	2	183	184	183	59	64	61	65	67.2	66.1	45.2	48.9	47	46	46.3	46.1
Chatham	♀	1	187	187	187	67	67	67	65.6	65.6	65.6	46	46	46	43.9	43.9	43.9
Daphne	♀	3	178	187	181	56	64	60	62	66.7	64.5	46.6	49.4	47.7	44.2	45.8	44.8
Duncan	♀	1	188	188	188	70	70	70	67	67	67	46	46	46	41.9	41.9	41.9
Gardner-near-Hood	♀	2	184	189	186	65	66	65	66.4	69.2	67.8	47.7	51.2	49.4	44	45.7	44.8
Hood	♀	1	182	182	182	64	64	64	67.5	67.5	67.5	49.3	49.3	49.3	45	45	45
Indefatigable	♀	19	177	192	184	59	67	63	60.1	68	64.3	43.4	49.7	46.8	40.7	46.5	43.7
Seymour	♀	1	182	182	182	65	65	65	63	63	63	47.8	47.8	47.8	43.6	43.6	43.6

TABLE XI—**Sula variegata** *and* **Sula cyanops**

Species	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Sula variegata	♂	23	426	464	445	173	192	183	98.1	107	103.4	46.5	54.3	50.8	70	82	77.1
Sula variegata	♀	25	433	492	465	175	196	183	98.4	112	105.7	50	55.8	53.2	76.4	84.6	80.3
Sula cyanops	♂	7	414	426	420	170	178	175	99	106	102.6	51	55	53.4	73	78	75.7
Sula cyanops	♀	6	428	440	432	173	187	180	100	106	103	53	57	55	75	80	78

TABLE XII—**Sula brewsteri**

Locality	Sex	Number of Specimens	Wing			Tail			Culmen			Tarsus			Middle Toe		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
San Benedicto	♂♂	1	387	387	387	189	189	189	92.3	92.3	92.3	43.9	43.9	43.9	65	65	65
Clipperton	♂♂	8	374	401	391	189	199	194	90	97.5	94.3	41.5	44.7	43.2	61.9	66	63.9
Cocos	♂♂	23	371	408	388	176	196	186	85	97.2	91.4	39.3	44.5	41.1	56.5	64	60.2
San Benedicto	♀♀	1	416	416	416	194	194	194	98.8	98.8	98.8	45.9	45.9	45.9	63.8	63.8	63.8
Clipperton	♀♀	8	401	419	412				91	102	98.1	43.2	47	45.6	61.2	67.7	65.6
Cocos	♀♀	14	400	418	409	181	203	190	94	101	96.4	43	49	44.9	62	67	63.9

TABLE XIII—Pelecanus fuscus

LOCALITY	SEX	NUMBER OF SPECIMENS	WING			TAIL			CULMEN			TARSUS			MIDDLE TOE		
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Galapagos	♂	5	567	605	582	137	152	144	339	370	353	74.2	78	75.9	103	110	105
California	♂	13	570	607	588	141	163	150	342	384	361	77	84.8	81	103	112	107
Galapagos	♀	2	530	535	533	131	136	134	300	312	306	69.2	73	71.1	94	96.3	95.2
California	♀	9	540	555	546	134	154	145	292	334	322	68	80	74.8	93	101	97.3

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EXPLANATION OF PLATE I

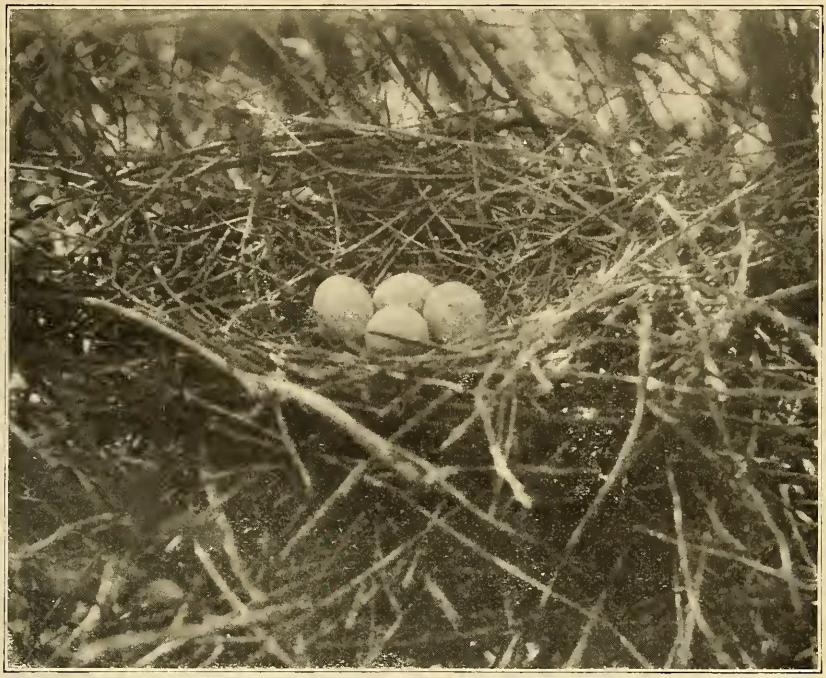
Fig. 1. *Sphcniscus mendiculus* (pp. 16-19).

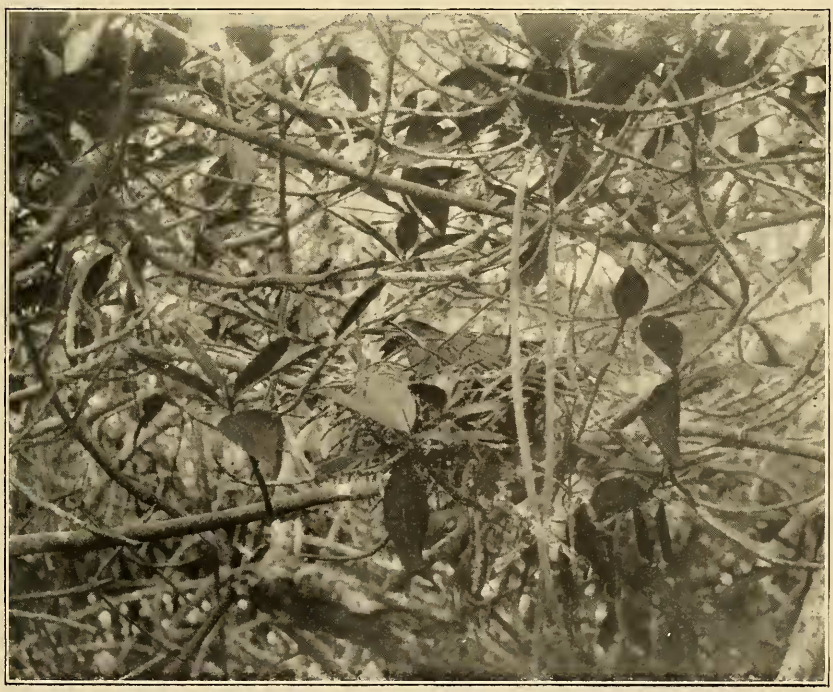
Fig. 2. Nest and eggs of *Himantopus mexicanus* (p. 54). Charles Island; February 25, 1906.

EXPLANATION OF PLATE II

Fig. 1. Nest and eggs of *Nyctanassa violacea* (pp. 59–62). Albemarle Island; March 10, 1906.

Fig. 2. *Butorides sundevalli* on nest (pp. 62–65). Chatham Island; February 10, 1906.

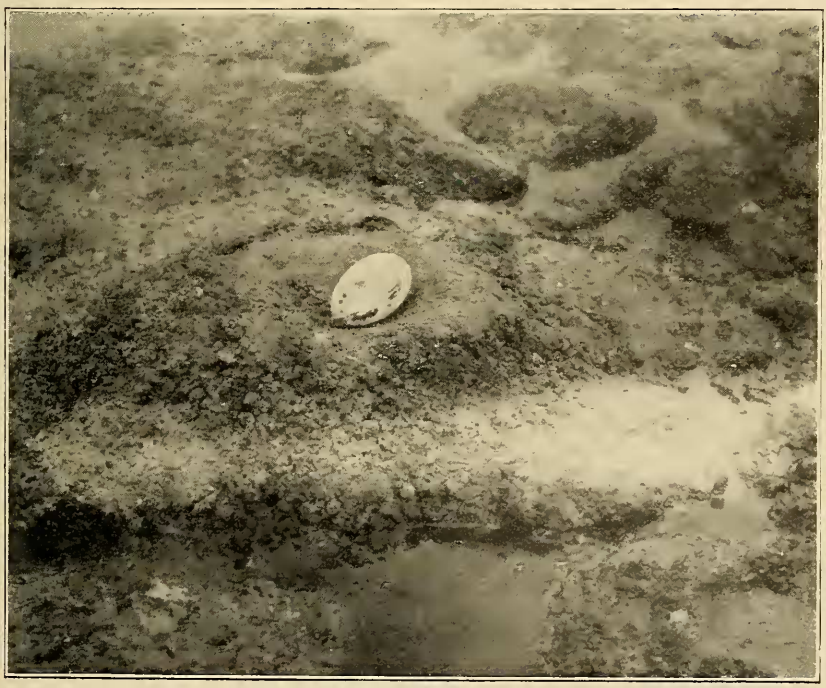




EXPLANATION OF PLATE III

Fig. 1. Salt lagoon with nests of *Phœnicopterus ruber* at the edge of the brush. Note crystalline deposits at the water's edge (pp. 66–76). James Island.

Fig. 2. Nest and egg of *Phœnicopterus ruber* (pp. 66–76). Charles Island; February 25, 1906.



EXPLANATION OF PLATE IV

Fig. 1. *Nannopterum harrisi* and nest (pp. 80–84). Albemarle Island; April 16, 1906.

Fig. 2. *Nannopterum harrisi* and nest (pp. 80–84). Albemarle Island; April 16, 1906.